The Burden of Heart Disease and Stroke in Washington State

December 2004

Community and Family Health

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Supported by Award Number U50/CCU021339-02 from the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.

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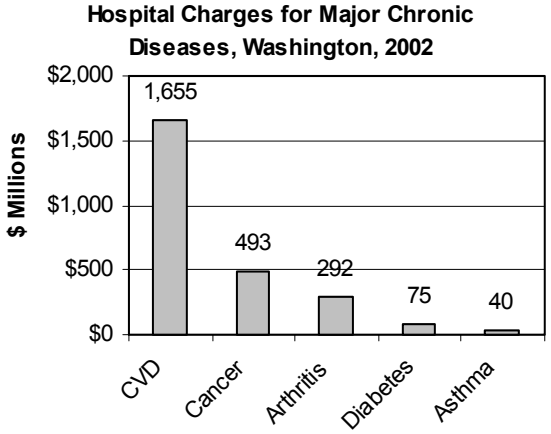
Executive Summary

Heart disease and stroke—the two most common forms of cardiovascular disease (CVD)—are the first and third leading causes of death in the United States and in Washington State. More than 16,000 Washingtonians died from CVD in 2002; this is 36% of all deaths. This report identifies the burden of heart disease and stroke in Washington State in terms of prevalence, morbidity and mortality rates. Also included are estimates of how many are at risk of developing the disease, and the costs and length of stay for CVD-related hospitalizations.

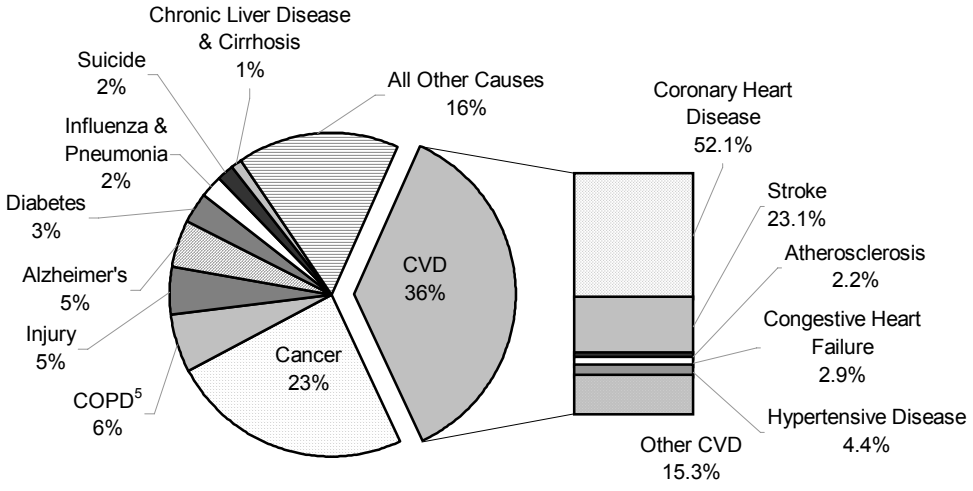
In 2002, the age-adjusted mortality rate for coronary heart disease—the most common form of heart disease—was lower in Washington State (148 per 100,000 population) compared to that of the nation (178 per 100,000). Coronary heart disease mortality is higher in specific groups, such as men, older age groups, and African Americans. The picture for stroke mortality in the state is alarming: 66 per 100,000 population, and the ninth highest in the nation. The national stroke mortality rate is 58 per 100,000 population.

Examining the mortality rates provides a picture of only the worst-case scenario—death—for these chronic conditions that begin often decades earlier. Those who suffer from a first or recurrent event and survive often require costly procedures and hospitalization. CVD accounted for nearly 4 out of 10 hospitalizations in 2002.

In addition, patients with CVD had a longer average length of stay than those hospitalized for other conditions. Stroke patients had a longer average length of stay (5.9 days) than did heart disease patients (4.8 days). Hospitalization charges for CVD in 2002 were $1.7 billion—three to forty times higher than hospitalization charges for other major chronic diseases in the figure below. This is still an underestimate of the true cost of CVD, as it looks only at direct charges for inpatient hospitalizations with CVD as the first listed diagnosis and does not include indirect costs such as outpatient procedures and missed days of work. When inpatient hospitalizations with CVD as any diagnosis were considered, total charges in 2002 *amounted to more than $4.1 billion, more than half of the total charges for inpatient hospitalizations.*



Leading Causes of Death, Washington, 2000-2002



After leaving the hospital, CVD patients are more likely to require further skilled care than other patients. More CVD patients, particularly stroke and congestive heart failure patients, were discharged to skilled nursing facilities, compared to patients with other conditions. Patients hospitalized for stroke or congestive heart failure were also more likely to die during their stay when compared to those hospitalized for non-CVD conditions.

A comprehensive system to address CVD should address not only the protocols hospitals have to manage their CVD patients, but also should examine the more upstream opportunities for interventions. This includes an effective, informed emergency medical system (EMS) and team of first responders to rapidly transport patients to a hospital capable of evaluating the patient for eligibility to receive time-dependent interventions. A comprehensive 9-1-1 system statewide is crucial to ensure timely arrival of EMS. And knowledge of the warning signs and symptoms will empower patients, providers, and the community to take an active role in improving outcomes of those who may be experiencing a heart attack or stroke.

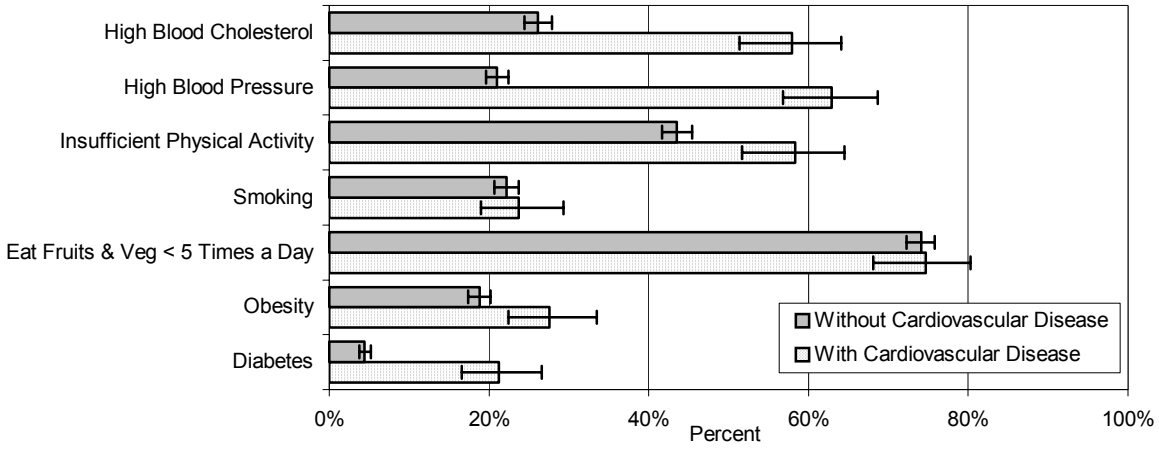
Approximately 7% of adults in Washington say they have been told by a health care professional that they have CVD (defined here as having had a heart attack, angina, coronary heart disease, or a stroke). Significantly more men than women have CVD, and prevalence increases with increasing age—25% of adults in Washington State age 65 and older have CVD. These numbers are likely to be an underestimate, since many people do not know they have CVD until they suffer a first heart attack or stroke.

Those who have CVD are significantly more likely to have high blood pressure, high blood cholesterol, diabetes, and obesity compared to those without CVD, as seen in the figure below. Controlling these risk factors is especially important in those who have already suffered a first event in order to prevent a recurrent event. Risk factor and lifestyle modification is critical to successful cardiac and stroke rehabilitation. However, only 28% of patients reported receiving rehabilitation following a heart attack or stroke.

In addition to those characteristics that cannot be changed, such as age and family history or genetics, there are several modifiable risk factors that increase the likelihood of developing heart disease and/or stroke. These include high blood pressure, high blood cholesterol, diabetes, obesity, tobacco use, poor nutrition, and physical inactivity. By aggressively addressing these risk factors, it is possible to prevent or delay some types of CVD.

The burden of heart disease and stroke in Washington State is immense. The good news, however, is that CVD and its complications can often be prevented and controlled. The hope is that the analyses presented in this report will serve to advise those with an interest in heart disease and stroke prevention to identify and prioritize recommendations for areas of needed action.

Prevalence of Risk Factors, Adults age 18 or older, with and without CVD, Washington BRFSS 2001



Introduction

He exercised and didn't smoke. Sure, he experienced stress in his work and daily life. And, he did like junk food. He had been prescribed a statin to reduce his cholesterol, as well as a drug to help lower his blood pressure. But when he experienced chest pain and shortness of breath without exercising, former President Bill Clinton did not waste any time in seeing his physician. His healthcare provider expects a complete recovery after undergoing quadruple bypass surgery. His provider also has urged him to begin aspirin therapy as well as lower his salt and fat intake.

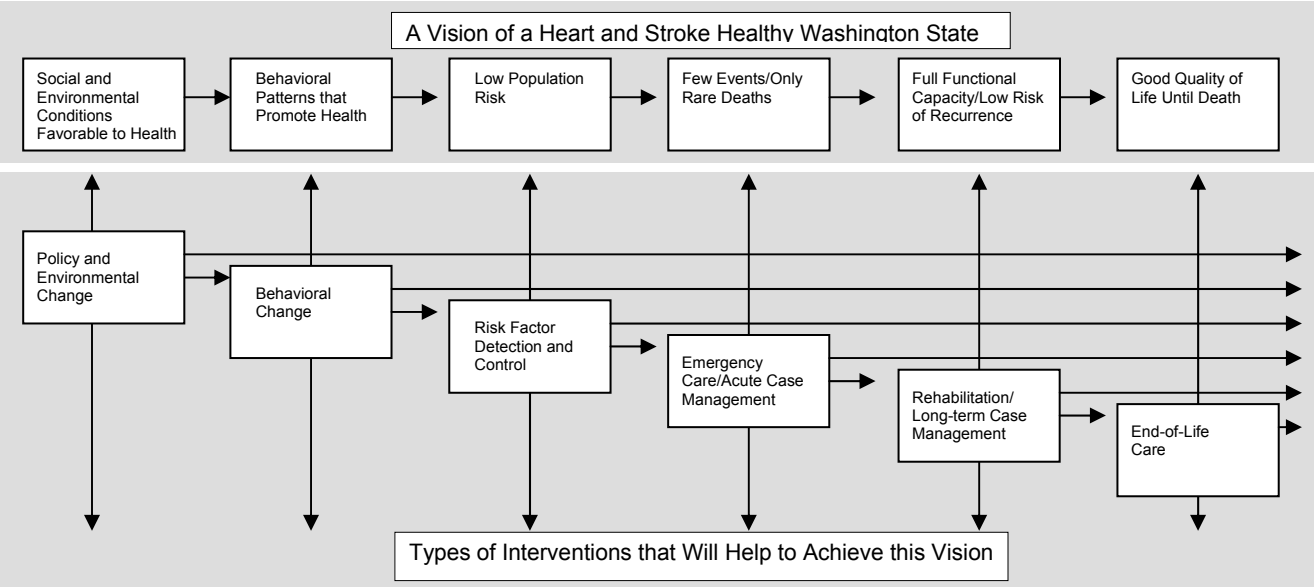
Background

Heart disease and stroke—the two most common forms of cardiovascular disease (CVD)—are the first and third leading causes of death in the United States and in Washington State. Cardiovascular disease is a grouping of vascular diseases that affects the heart and circulatory system. More than 16,000 Washingtonians died from a form of CVD in 2002, comprising 36% of all deaths.

In response to national trends that indicate an epidemic of heart disease and stroke, the Centers for Disease Control and Prevention (CDC) published in 2003 *A Public Health Action Plan to Prevent Heart Disease and Stroke*. This document lays out a comprehensive public health framework to prevent and control heart disease and stroke (See Schematic 1). The plan identifies the major factors that contribute to the progression of cardiovascular disease, as well as possible strategies to reduce risk and manage the disease more effectively.

For example, policy and environmental change interventions would address unfavorable social and environmental conditions involved in both the early development of CVD, as well as outcomes after its onset (e.g., by improving accessibility, use, and quality of health care). Promoting healthy behaviors in the general population could reduce the effects of adverse social and environmental conditions as well as avoid adoption of risk factors in the first place.

Schematic 1. Comprehensive Approach to the Prevention and Control of Heart Disease and Stroke
(adapted from CDC, *A Public Health Action Plan to Prevent Heart Disease and Stroke)*



Detecting and controlling risk factors have been a mainstay of primary prevention of heart disease and stroke, and must still be emphasized once risk factors are present, to prevent both first and recurrent CVD events.

For those victims of first events who survive long enough to receive intervention, emergency care and acute case management are important secondary prevention measures. This approach continues to apply when survivors of previous acute CVD events experience recurrent ones. Secondary prevention also includes rehabilitation, which should follow most acute events, and long-term case management, which continues through the remainder of a victim's life.

Definitions

Because CVD encompasses many conditions, it may be helpful at this point to define several key terms that will be used throughout this report. Schematic 2, below, provides a visual representation of various cardiovascular diseases, based on the International Classification of Diseases (ICD) codes.

Cardiovascular disease refers to any of the disorders that affect the circulatory system, including coronary heart disease, congestive heart failure, and stroke.

Diseases of the heart includes coronary heart disease, congestive heart failure, and others. This category does *not* include atherosclerosis or cerebrovascular disease (stroke).

Coronary heart disease (CHD) is caused by impaired circulation in one or more coronary arteries. It is often diagnosed due to chest pain (angina) or a heart attack. CHD is the most common type of CVD; over 50% of CVD deaths are due to CHD.

Congestive heart failure (CHF), also known as heart failure, is an impairment in the pumping function of the heart due to heart disease. It often leads to physical disability and increased risk of additional CVD events.

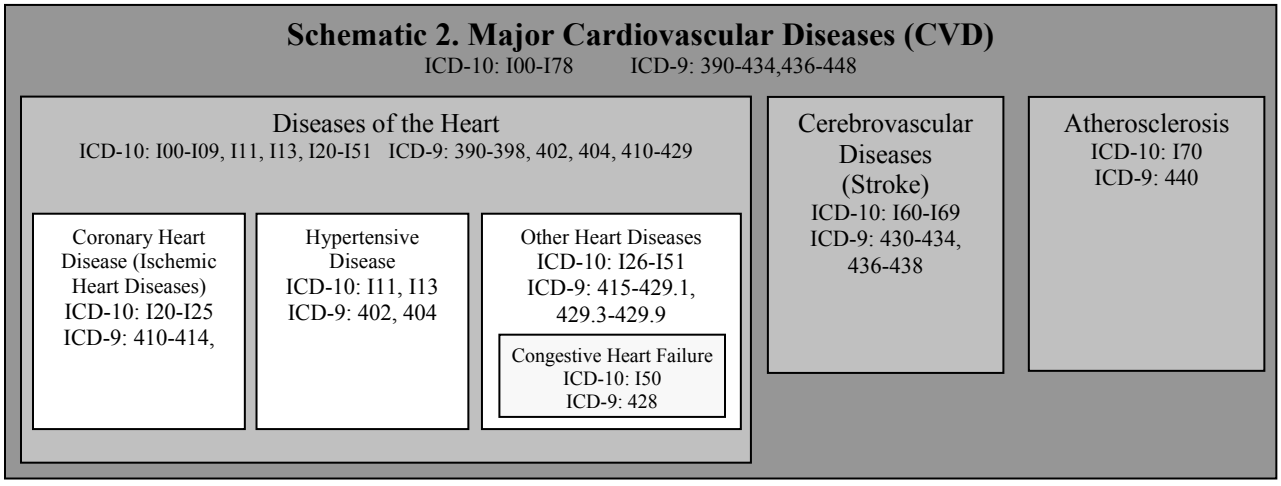
Stroke—also known as cerebrovascular disease, or a brain attack—is the interruption of blood supply to the brain due to either an obstruction or rupture of a blood vessel. Stroke that is not fatal often leads to some level of physical and/or cognitive disability.

Please refer to the Glossary for additional definitions of terms used in this report.

Organization of the Report

The report has been organized to follow the natural history of CVD—from pre-pathogenesis through accrual of risk factors to development of CVD and its sequelae—as was outlined in Schematic 1.

Chapter 1 discusses CVD risk among Washington State residents. While it is true that more than half of diagnosed heart disease and stroke occurs in those over age 65, risk factors that lead to the development of these diseases develop much earlier—even in childhood. Heart



disease and stroke often develop from preexisting **atherosclerosis** (buildup of plaque in arteries that supply the heart, brain, and lower extremities) and **hypertension** (high blood pressure). Modifiable risk factors that cause heart disease and stroke include high blood cholesterol, high blood pressure, diabetes, smoking, and obesity. Behaviors such as physical inactivity and poor nutrition lead to the development of these risk factors and, so, can be considered risk factors as well. Chapter 1, based on analysis of data from the Washington Behavioral Risk Factor Survey, describes the prevalence and trends in CVD risk factors in Washington State adults, compared to the United States and *Healthy People 2010*.

Chapter 2 examines the characteristics of those who have CVD. The focus of this chapter is on how well major risk factors are currently controlled among those with CVD. The role of physician advice is explored, as well as the extent to which those with the disease are aware of, and have taken steps to, control modifiable risk factors through lifestyle changes.

Chapter 3 addresses utilization and costs associated with heart disease and stroke inpatient hospitalizations, emphasizing the magnitude of the burden placed on the health care system to adequately manage the population with heart disease and stroke. The cost to Washingtonians for CVD hospitalizations in 2002 was 4 billion dollars.[1]

Chapter 4 describes the patterns in mortality due to heart disease and stroke by age, race and sex, and includes trends over time. Although heart disease and stroke affects men and women in all age groups, races, and ethnicities, some groups suffer a disproportionate share of the heart disease and stroke burden. For those who have a CVD event, survival depends on getting help quickly. Knowledge of the signs and symptoms of heart attack and stroke among the general population facilitates calling for help in the event of a heart attack or stroke; a well-trained emergency response team ensures that the response will be swift and appropriate. Thus, this chapter examines public knowledge of the signs and symptoms of CVD, as well as the proportion of cardiac deaths that occur prior to being transported to an emergency department (ED).

Each chapter concludes with a discussion that summarizes the data presented, limitations inherent in the data available, and introduces areas where interventions could be considered to address the burden presented. Further interpretation of the analyses and implications for interventions will be left to a statewide Advisory Council.

Purpose of the Report

This report identifies the burden of heart disease and stroke in Washington State in terms of prevalence, morbidity and mortality rates. Also included are estimates of how many are at risk of developing the disease, and the costs and length of stay for CVD-related hospitalizations. The primary purpose of this document is to provide the epidemiological data to inform the Advisory Council in the development of a statewide plan for the prevention of heart disease and stroke, with an emphasis on secondary prevention.

The burden of heart disease and stroke are extraordinarily high, yet the diseases themselves are largely preventable. The Washington State Department of Health hopes that this planning document will help raise an awareness of the urgency that these diseases demand. It is our intent that these data ultimately will lead to improved cardiovascular health, and a reduction in the burden associated with heart disease and stroke in Washington State.

[1] Note: Cost refers to charges for hospitalization. Charges do not include outpatient visits, pharmacy costs, or costs related to lost productivity.

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Chapter 1. Risk Factors for Heart Disease and Stroke

Certain factors that increase the risk of cardiovascular disease, such as age and family history (genetic make-up) cannot be changed. For other factors, however, alterations in lifestyle, prescription medication, and/or medical intervention can prevent the onset of CVD or improve disease outcomes. *Modifiable risk factors* include high blood cholesterol,[2] high blood pressure,[3] cigarette smoking, physical inactivity, obesity, diabetes, and eating habits that lead to these chronic conditions.

Coronary heart disease and stroke have several modifiable risk factors in common, yet their impact on each may vary. For example, high blood pressure is a moderate risk factor for heart disease, but a strong risk factor for stroke. Table 1 shows the strength of the association between each risk factor and coronary heart disease and stroke (expressed as the increased risk of disease for those with the risk factor, as compared to those without the risk factor, known as *relative risk*). Also shown is an estimate of the proportion of heart disease and stroke cases that could be avoided if no one had the risk factor. For example, about 43% of coronary heart disease cases could be avoided if no one had high blood cholesterol. The amount of disease that could be avoided, known as *population attributable risk*, depends on both the strength of association between the risk factor and CVD, and on how prevalent the risk factor is in the population. For example, both obesity and diabetes are moderately strong risk factors for stroke, but because obesity is more common than diabetes, it is responsible for about 17% of heart disease cases while diabetes is responsible for about 8%.

Table 1. Modifiable Risk factors for Coronary Heart Disease and Stroke, United States

	Strength of the Association (Relative Risk)		Proportion of Avoidable Cases, % (Range)	
Risk Factor	Coronary Heart Disease	Stroke	Coronary Heart Disease	Stroke
High Blood Cholesterol	Moderate (RR 2-4)	Moderate (RR 2-4)	43 (39-47)	10 (0-20)
High Blood Pressure	Moderate (RR 2-4)	Strong (RR>4)	25 (20-29)	26 (20-50)
Cigarette Smoking	Moderate (RR 2-4)	Moderate (RR 2-4)	22 (17-25)	12 (11-25)
Diabetes	Moderate (RR 2-4)	Moderate (RR 2-4)	8 (1-15)	3 (0-7)
Obesity	Weak	Moderate (RR 2-4)	17 (7-32)	20 (15-25)
Physical Inactivity	Weak	Possible	35 (23-36)	No data

Source: *Chronic Disease Epidemiology and Control*, Brownson, Remington, and Davis, APHA, 1998.

Data Source and Conventions

Prevalence data for modifiable risk factors in Washington were obtained from the Behavioral Risk Factor Surveillance System (BRFSS), an annual state-wide population-based random digit dial telephone survey of the adult population ages 18 and older. Respondents were asked whether they have ever been told by a healthcare provider that they have diabetes, cardiovascular disease, elevated blood cholesterol and/or high blood pressure. Obesity refers to having a body mass index (BMI) greater than or equal to 30, where BMI is calculated as a ratio of weight to height (kg/m^2), using self-reported weight and height.

Fruit and vegetable consumption was ascertained by asking respondents how often they consumed specific fruits and vegetables. An overall index measure of how many times a day fruits and vegetables were eaten was constructed, with respondents divided into those who ate fruits and vegetables five times a day, and those who did not. Note that the BRFSS measure of *times* per day differs from the recommendation to consume five or more *servings* of fruits and vegetables per day. A recent study[4] has shown that the current BRFSS measure tends to underestimate the true proportion of those who meet the recommended level of five servings of fruits and vegetables by nearly 50%.

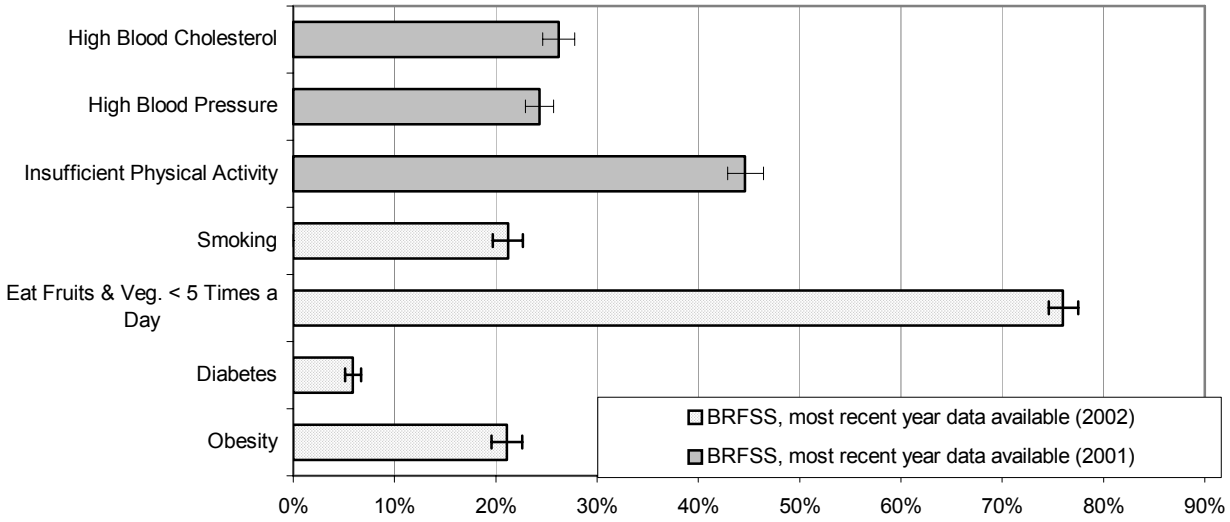
Insufficient leisure time physical activity refers to less than 30 minutes of moderate activity at least

[2] High blood cholesterol is a concentration of the lipid cholesterol in the bloodstream $\geq$ 200 mg/dL.

[3] High blood pressure is the persistent elevation of systolic blood pressure $\geq$ 140mm/Hg and/or diastolic blood pressure $\geq$ 90mm/Hg.

[4] Bensley L, Van Eenwyk J, Bruemmer BA. *Measuring fruit and vegetable consumption: providing serving size information doubles estimated percent eating five per day*. Journal of the American Dietary Association. 2003;103 (11):1530-2.

Figure 1. CVD Risk Factors Among Washington Adults, 2001 or 2002



five times per week, or less than 20 minutes of vigorous activity at least three times per week. Current adult smoking is the percent of BRFSS respondents who had smoked at least 100 cigarettes in their lifetime and answered "every day" or "some days" when asked how often they currently smoked. Please refer to the Data Appendix for more information about the BRFSS.

This chapter presents data on the overall prevalence of risk factors in the general population, prevalence by sex, age, and race, and trends over time. Estimates were age-adjusted to the 2000 U.S. population, using U.S. census data for population denominators. Determination of race/ethnicity was based on the respondent's self-description of race (white, Black, American Indian or Alaska Native, and Asian, Native Hawaiian or other Pacific Islander) and ethnicity (Hispanic or non-Hispanic). Three years' data were combined to minimize instability of the estimate due to small sample size. Please see the Technical Appendix for more information on methods used in the analysis presented in this chapter.

Healthy People 2010 (HP2010) is a set of objectives for the nation intended to guide program development and to help monitor progress at a state and national level. On the following pages, the HP2010 objective is presented, where available, on graphs that depict trends in CVD risk factors. A list of HP2010 objectives for CVD risk factors appear in the Technical Appendix.

Prevalence of CVD Risk Factors

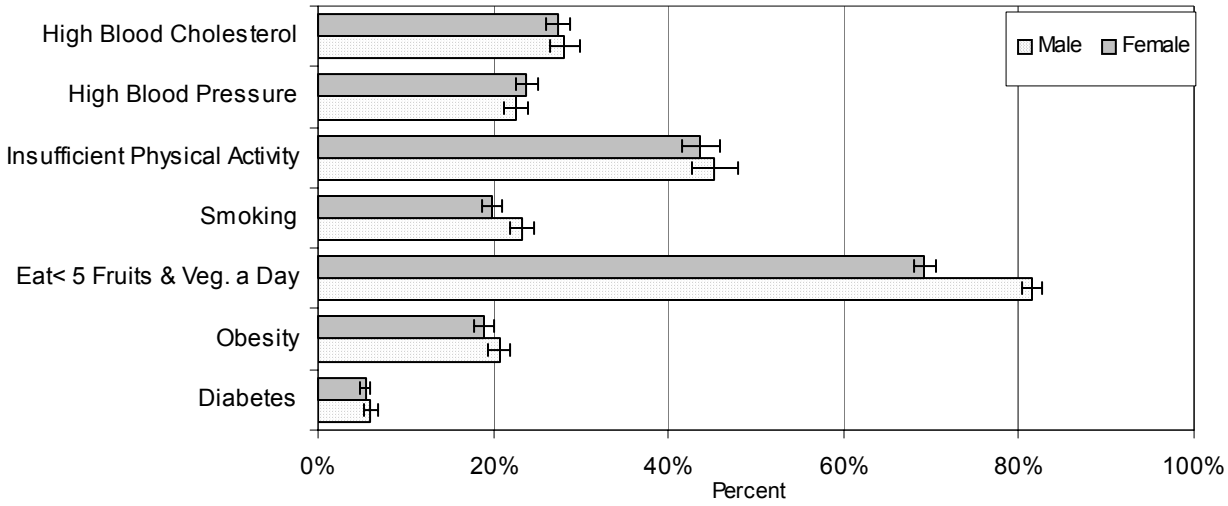
Figure 1 displays the prevalence of selected CVD risk factors among adults age 18 and over in Washington, according to data from the 2001 or 2002 Washington BRFSS. A high proportion of adults (76%) reported eating fruits and vegetables less than five times a day. In addition, 45% of adults reported levels of physical activity that were insufficient to maintain good cardiovascular health. About 29% of Washington residents had been told by a healthcare provider that they have high blood cholesterol and 24% that they have high blood pressure.

Prevalence of CVD Risk Factors by Sex

Figure 2 displays the prevalence of selected risk factors for cardiovascular disease by sex. Significantly more males than females smoked (24% vs. 19%), were obese (21% vs. 19%), and consumed fruits and vegetables less than five times a day (82% vs. 69%).

Males and females had similar prevalences of diabetes, insufficient leisure time physical activity, high blood pressure, and high blood cholesterol.

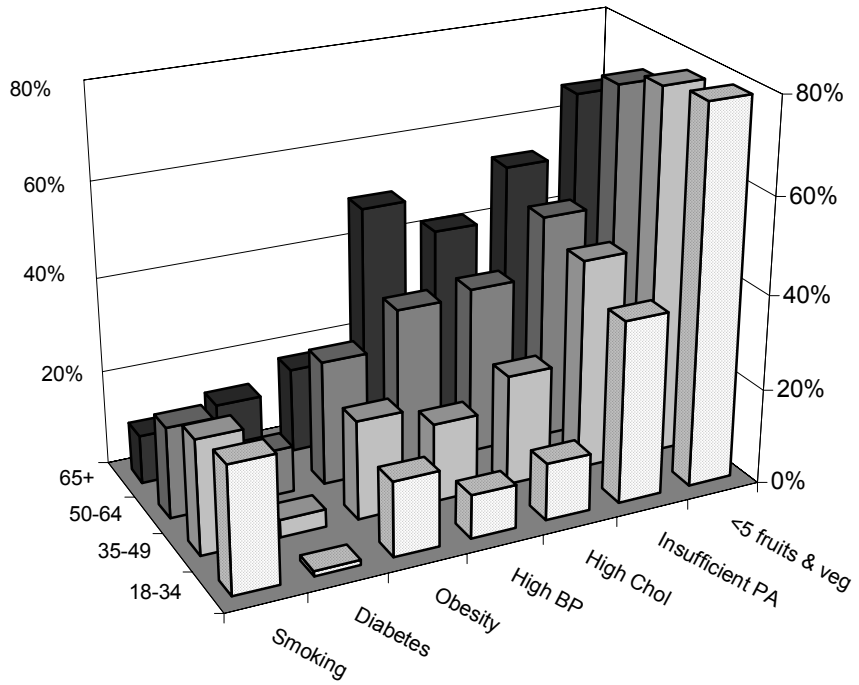
Figure 2. CVD Risk Factors by Sex, Washington BRFSS, 2001 or 2002



Prevalence of CVD Risk Factors by Age

Figure 3 displays the modifiable CVD risk factors by age group. The prevalence of all risk factors among adults varied significantly by age group. The prevalence of high blood cholesterol, high blood pressure, insufficient leisure time physical activity, and diabetes increased with increasingly older age group. Smoking and eating fruits and vegetables less than five times a day showed an opposite trend: decreasing prevalence with increasingly older age group. Obesity prevalence increased with increasing age group up until age 65 years, where prevalence decreased.

Figure 3. Risk Factors by Age, Washington BRFSS



Prevalence of CVD Risk Factors by Race and Ethnicity

Figure 4. Hypertension by Race & Ethnicity
Washington State, 1997, 1999, 2001

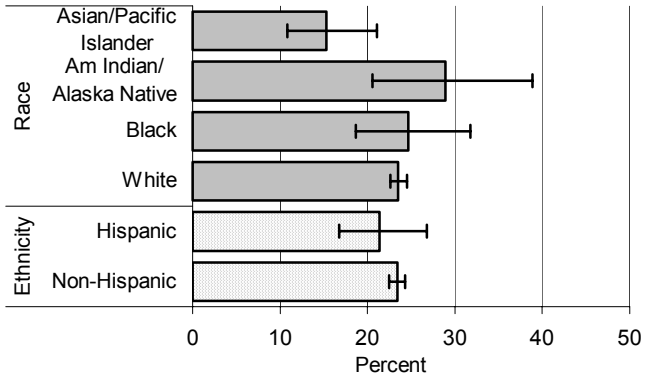


Figure 5. Smoking by Race and Ethnicity
Washington State, 2000-2002

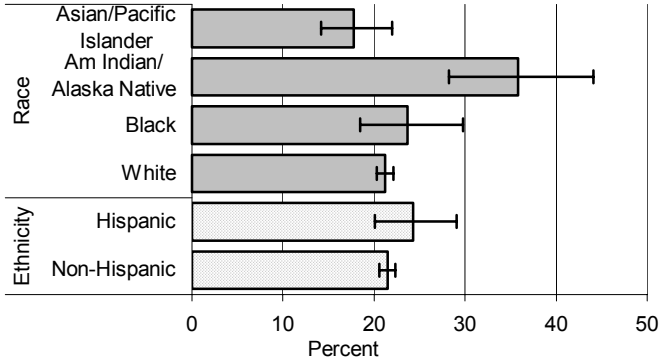
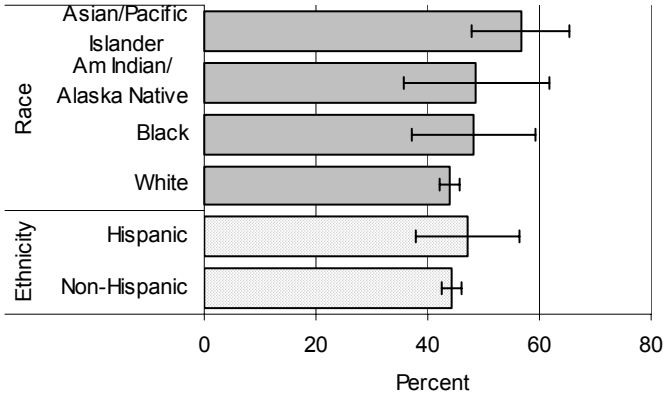


Figure 6. Insufficient Physical Activity by Race and Ethnicity
Washington State, 2001



Prevalence of Hypertension by Race & Ethnicity

Figure 4 compares the average lifetime prevalence of high blood pressure in Washington in 1997, 1999 and 2001 combined by racial and ethnic group.

The prevalence of high blood pressure among American Indians or Alaska Natives (29%) and Whites (24%) was statistically significantly higher than that of Asian and Pacific Islanders (15%). There was no difference in the prevalence of high blood pressure for Hispanics compared to non-Hispanics.

Prevalence of Current Cigarette Smoking by Race & Ethnicity

Figure 5 compares the prevalence of current cigarette smoking in Washington between 2000-2002 combined by racial and ethnic group.

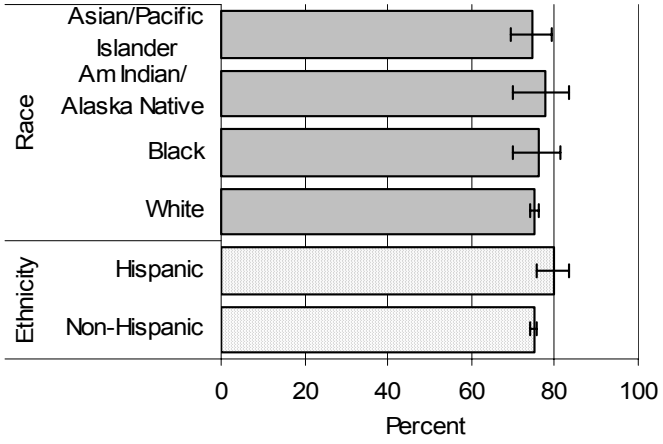
American Indians or Alaskan Natives had the highest prevalence of smoking (36%), compared to African Americans (24%), whites (21%), and Asian and Pacific Islanders (18%).

Prevalence of Insufficient Leisure Time Physical Activity by Race & Ethnicity

Figure 6 compares the prevalence of insufficient leisure time physical activity in Washington for 2001 by racial and ethnic group.

All racial and ethnic groups displayed a high prevalence of insufficient physical activity. Asian and Pacific Islanders had a higher prevalence compared to whites (57% and 44%, respectively). There were no significant differences in prevalence between Hispanics and non-Hispanics.

Figure 7. Eat Fruits & Vegetables < 5 Times a Day by Race & Ethnicity
Washington State, 1998, 2000, 2001

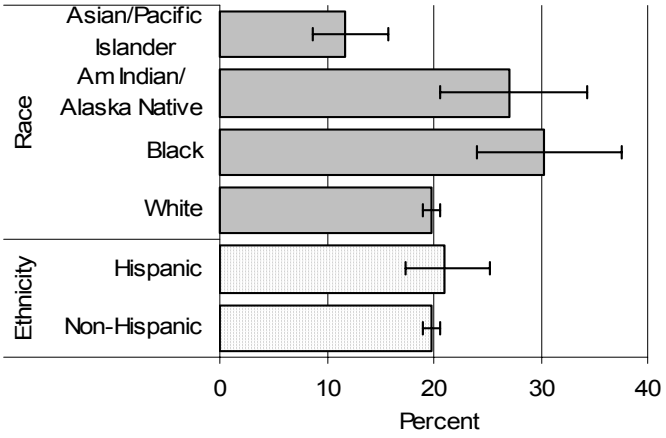


Prevalence of Fruit & Vegetable Consumption by Race & Ethnicity

Figure 7 compares the prevalence of eating fruits and vegetables five or more times per day by racial and ethnic group.

There was no difference by race in the proportion of adults who ate fruits and vegetables less than five times a day. Although significantly more Hispanics than non-Hispanics said they ate fruits and vegetables less than five times a day, the proportions were substantially high for both groups (80% and 75%, respectively).

Figure 8. Obesity by Race & Ethnicity
Washington State, 2000-2002



Prevalence of Obesity by Race & Ethnicity

Figure 8 compares the prevalence of obesity in Washington between 2000-2002 by racial and ethnic group.

The prevalence of obesity was highest for African Americans (30%) and American Indians or Alaskan Natives (27%), compared to whites (20%) and Asian, Native Hawaiian, or other Pacific Islanders (12%). There was no significant difference in the prevalence of obesity between Hispanic and non-Hispanics.

Prevalence of High Blood Cholesterol and Diabetes by Race & Ethnicity

No significant differences were noted in the prevalences of high blood cholesterol or diagnosed diabetes by race or ethnicity. Particularly in the case of diabetes, however, it may be that we were unable to detect any differences due to the very small number of survey respondents with diabetes in some racial and ethnic groups.

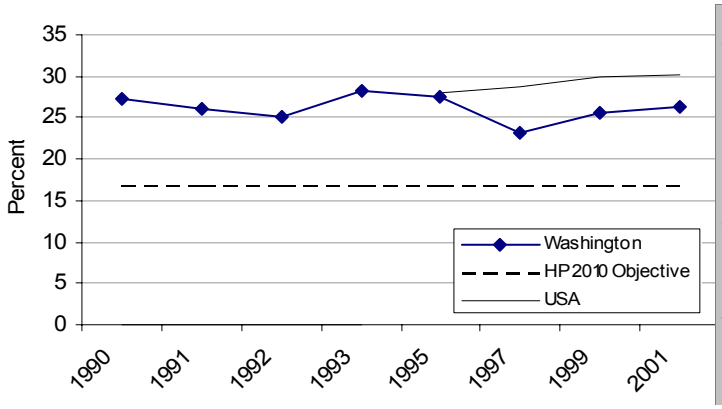
General Trends in Prevalence of CVD Risk Factors

The past decade has witnessed a dramatic increase in two major CVD risk factors. Diabetes prevalence increased from 4% in 1990 to 6% in 2002, a 31% rate of increase. Obesity prevalence increased from 10% in 1990 to 21% in 2002, a 127% rate of increase. Trends in other risk factors, such as smoking, hypertension, high blood cholesterol, physical activity, and nutrition, have remained relatively stable over time.

Trends in High Blood Cholesterol

Between 1990 and 2001, the lifetime prevalence of high blood cholesterol in Washington remained about the same (Figure 9). A similar pattern was seen in self-reported prevalence of high blood cholesterol in the nation from 1995 to 2001. Neither Washington nor the nation has met the Healthy People 2010 Objective for blood cholesterol prevalence.

Figure 9. Trends in High Blood Cholesterol Prevalence, Adults ages 18 and older, Washington and the United States, 1990-2002

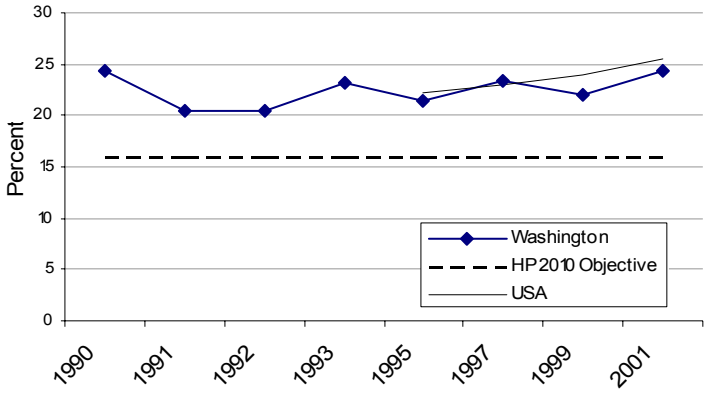


Data Source: Washington Behavioral Risk Factor Surveillance System, 1990-2002. Washington data are age-adjusted to the U.S. 2000 standard population

Trends in High Blood Pressure

Between 1990 and 2001, the lifetime prevalence of high blood pressure in Washington remained about the same (Figure 10). A similar pattern was seen in self-reported prevalence of high blood cholesterol in the nation from 1995 to 2001. Neither Washington nor the nation has met the Healthy People 2010 Objective for blood pressure prevalence.

Figure 10. Trends in High Blood Pressure Prevalence, Adults ages 18 and older, Washington and the United States, 1990-2002

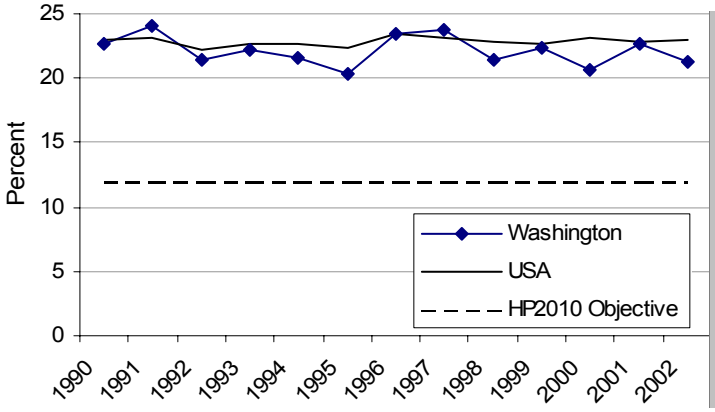


Data Source: Washington Behavioral Risk Factor Surveillance System, 1990-2002. Washington data are age-adjusted to the U.S. 2000 standard population

Trends in Cigarette Smoking

Between 1990 and 2002, the prevalence of current cigarette smoking in Washington remained about the same (Figure 11). A similar pattern was seen in self-reported prevalence of current cigarette smoking in the nation during this period. Neither Washington nor the nation has met the Healthy People 2010 Objective for prevalence of cigarette smoking.

Figure 11. Trends in Cigarette Smoking, Adults ages 18 and older, Washington and the United States, 1990-2002

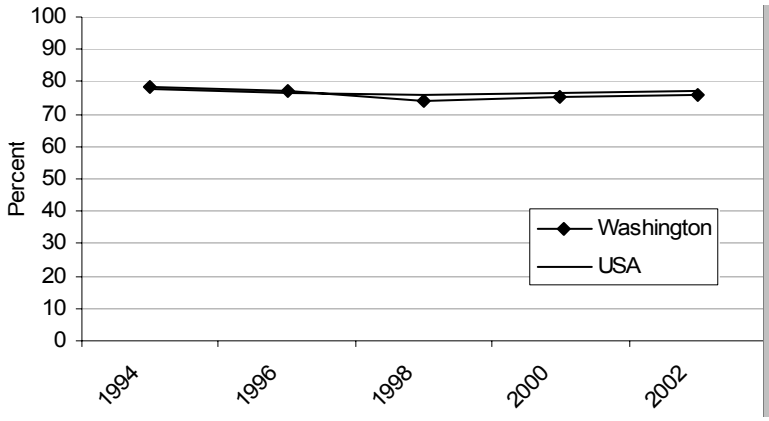


Data Source: Washington Behavioral Risk Factor Surveillance System, 1990-2002. Washington data are age-adjusted to the U.S. standard population

Trends in Fruit & Vegetable Consumption

Between 1994 and 2002 the prevalence of eating fruits and vegetables five times a day remained constant in Washington (Figure 12). A similar pattern was seen in self-reported prevalence of fruit and vegetable consumption in the nation during this period. (Data on fruit and vegetable consumption was not measured prior to 1994.)

Figure 12. Trends in Fruit &Vegetable Consumption, Adults ages 18 and older, Washington and the United States, 1990-2002

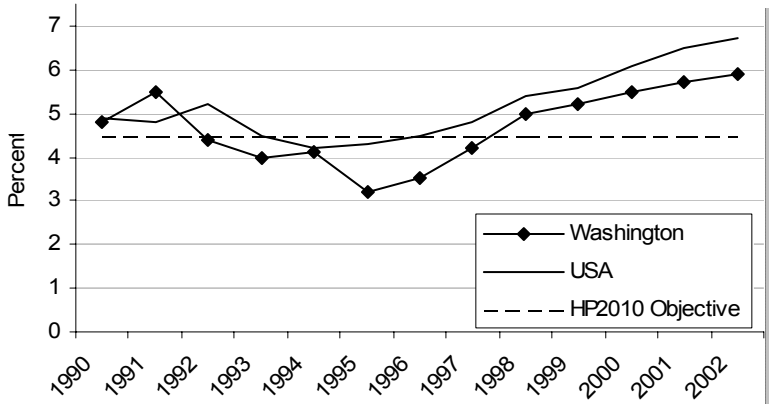


Data Source: Washington Behavioral Risk Factor Surveillance System, 1990-2002. Washington data are age-adjusted to the U.S. standard population

Trends in Diabetes

Over the past 8 years, the percentage of Washington adults who reported having diabetes rose 50% (from 4% in 1994 to 6% in 2002). A similar pattern was seen in self-reported prevalence of diagnosed diabetes in the nation during this period. Washington and the nation continue to move farther away from the Healthy People 2010 Objective for diabetes prevalence. (Prior to 1993, the BRFSS measure of diabetes included women with gestational diabetes and is therefore not comparable to later years.)

Figure 13. Trends in Diabetes Prevalence, Adults ages 18 and older, Washington and the United States, 1990-2002

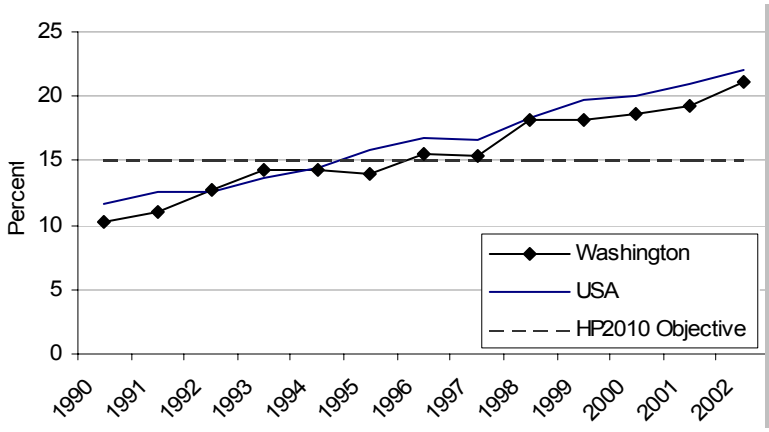


Data Source: Washington Behavioral Risk Factor Surveillance System, 1990 2002. Washington data are age-adjusted to the U.S. standard population

Trends in Obesity

Over the last decade, the percentage of Washington adults who are obese (BMI ≥ 30) rose from 10% in 1990 to 21% in 2002 (Figure 14). This pattern is similar to that of the U.S. as a whole. Both Washington and the nation continue to move farther away from the Healthy People 2010 Objective for obesity prevalence.

Figure 14. Trends in Obesity Prevalence, Adults ages 18 and older, Washington and the United States, 1990-2002



Data Source: Washington Behavioral Risk Factor Surveillance System, 1990-2002. Washington data are age-adjusted to the U.S. 2000 standard population

Discussion

Some of the cardiovascular disease burden is avoidable through decreasing modifiable risk factors. Yet about 25% of adults in Washington had two strong risk factors for CVD in 2002: high blood cholesterol and high blood pressure (see Figure 1, p. 6). About 20% reported a behavior moderately associated with CVD: current cigarette smoking. Insufficient leisure time physical activity and consumption of fruit and vegetables, quite prevalent among Washington adults, is weakly associated with cardiovascular disease but strongly associated with obesity, which is also a risk factor for CVD. Obesity, affecting 25% of the adult population, has shown a dramatic increase in the past decade, as has diabetes, which also increases CVD risk.

The prevalences of some of risk factors were higher among older age groups (hypertension, insufficient leisure time physical activity and diabetes), among males (smoking, obesity and insufficient consumption of fruits and vegetables) and among American Indians and Alaska Natives (smoking, obesity, hypertension), Blacks (obesity) and Asian and Pacific Islanders (insufficient leisure time physical activity).

Readers should keep in mind that estimates are based on self-report, and may be subject to certain limitations inherent in this method. For example, prevalence of high blood cholesterol and hypertension are based on the respondent's recall of what their health provider told them, not on physiologic measures.

Primary prevention efforts to decrease CVD risk factors may also reduce other chronic diseases. In addition to reducing the risk for CVD, smoking prevention and cessation may also decrease the incidence of certain cancers, particularly lung cancer. Efforts to increase opportunities for physical activity and access to healthy foods may reduce the prevalence of certain cancers, obesity and obesity-related diseases such as diabetes.

A number of programs implemented by the Department of Health and its partners emphasize healthy behaviors. For example, the Tobacco Prevention and Control Program aims to prevent youth from beginning tobacco use and on helping people to quit using tobacco. The Physical Activity and Nutrition Program aims to increase opportunities for physical activity and improve access to healthy foods through policy and environmental changes. Community-based initiatives under Steps to a Healthier Washington help to enhance and integrate health promotion programs in schools, neighborhoods, healthcare settings and worksites to reduce the risk factors responsible for chronic diseases. The Basic Food Nutrition Education Program provides information to help people with low incomes make healthy food choices and choose active lifestyles. In addition to programs to improve disease outcomes, the Diabetes Prevention and Control Program provides educational programs to help prevent diabetes onset. For more information on programmatic activities in these areas, please visit the Washington State Department of Health, Division of Community and Family Health at: http://www.doh.wa.gov/cfh/cfh.htm.

By focusing on changes in individual behavior and in the social conditions that support healthy behaviors, these programs address the health promotion and risk reduction aspects of CVD prevention. Health providers, in their capacity as monitors and advisors of their patients' CVD risk factors, are an important complement to public health activities. The American Heart Association's (AHA) *Guidelines for Primary Prevention of Heart Disease and Stroke* directs providers to conduct risk factor assessment in all patients age 20 years and older, that includes smoking status, diet, physical activity, blood pressure, fasting blood lipid level and BMI. In addition, healthcare providers are advised to counsel patients at elevated risk for CVD on the most effective measures to take to reduce their CVD risk. This includes setting goals to change behavior through stopping smoking, managing weight, achieving recommended levels of physical activity and adopting a healthy diet that includes fruits, vegetables, grains and legumes, and low fat meat and dairy products. In addition, therapeutic interventions to control high blood cholesterol, hypertension, and diabetes may include a combination of prescription medication, lifestyle changes, and self-management to reduce risk of a CVD event.

By incorporating strategies to help clinicians achieve better adherence to appropriate guidelines, a statewide heart disease and stroke prevention program will help support the public health primary prevention efforts of DOH and its partners in reducing the risk factors that lead to heart disease and stroke.

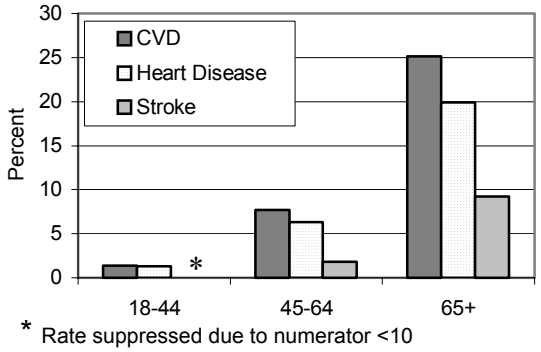
Chapter 2. People with Heart Disease and Stroke

Data describing people who have been told by a health professional that they have cardiovascular disease were derived from the statewide Behavioral Risk Factor Surveillance System. Questions about self-reported CVD appeared on the survey in 1996, 1998 and 2001. Note that data were limited by the nature of the survey to exclude information on those who suffered more extreme outcomes of CVD, such as institutionalization in a skilled nursing facility or death. (See Technical Appendix for more information).

Prevalence of CVD by Age, Sex, and Race and Ethnicity

Overall, slightly more than 7% of adults say they have been told by a health professional that they have *cardiovascular disease* (CVD), defined in the BRFSS survey as heart attack, angina or coronary heart disease, or stroke.[5] The prevalence of cardiovascular disease is significantly higher among males (8%) than females (6%). CVD prevalence increases with increasing age, from 1% of people age 18 to 44 to 25% of people age 65 and older. Figure 15 displays overall self-reported CVD prevalence by age, as well as the distribution of self-reported heart disease and stroke by age group.

Figure 15. Cardiovascular Diseases by Age Group, Washington 2001



* Rate suppressed due to numerator <10

CVD includes two subcategories, heart disease and stroke. About 6% of adults say they have been told by a health professional that they have *heart disease*, defined in the BRFSS survey as a heart attack, angina, or coronary heart disease. The prevalence of heart disease varies by sex and is significantly higher among males (7%) than females (5%). The prevalence of heart disease also increases with increasing age from 1% of people age 18-44 to 20% of people age 65 and older (Figure 15).

About 2% of adults say they have been told by a health professional that they had a *stroke*. The prevalence of stroke does not vary by sex, but significantly impacts older adults. It affects less than 1% of people age 18 to 44; 2% of people age 45 to 64; and 9% of people age 65 and older (Figure 15).

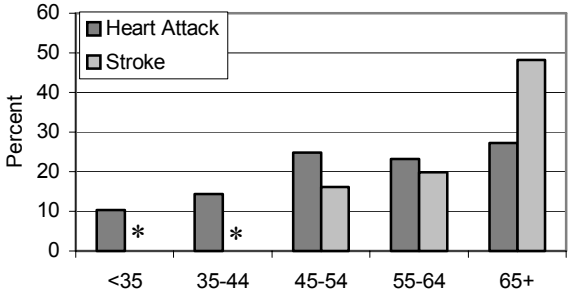
There were no significant differences in prevalence of CVD, heart attack or stroke by race or ethnicity.

The self-reported prevalence of CVD and heart disease prevalence did not change significantly between 1996 and 2001. The prevalence of stroke, however, increased significantly from 1.6% in 1996 to 2.3% in 2001.

Age at First Diagnosis of CVD

Slightly more than half of first heart attacks occurred to adults age 55 years or older. Nearly half of first strokes happen at age 65 years or older. Figure 16 displays the distribution of the age at first heart attack or first stroke, according to respondents' self-report.

Figure 16. Self Reported Age at First Heart Attack or Stroke, Washington, 2001

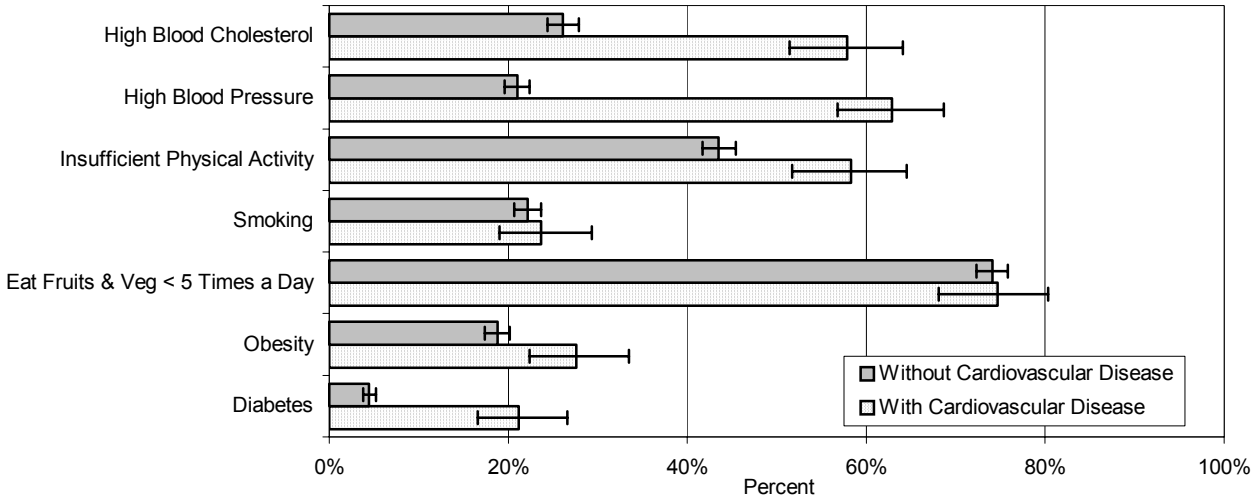


* Rate suppressed due to numerator <10

On average, respondents said that they had their first heart attack ten years ago. In contrast, those who had a stroke said that seven years had passed since their first stroke.

[5] This definition may not match the ICD definition used in the sections on morbidity and mortality

Figure 17. Prevalence of Risk Factors, Adults age 18 or older, with and without CVD, Washington BRFSS 2001



Fifteen percent of those who had a heart attack and 23% of those who had a stroke said the event occurred within the past year. In addition, 37% and 24% reported having their first heart attack or stroke over 10 years ago, respectively.

Cardiac and Stroke Rehabilitation

Only 28% of those who report having had a heart attack or stroke went to outpatient rehabilitation after leaving the hospital. It is not known how many patients had been referred by their doctors to a rehabilitation program.

Risk Factors for People with CVD

The previous chapter discussed risk factors for CVD among the general population. This section discusses the higher prevalence of these factors[6] among adults with cardiovascular disease compared to those without cardiovascular disease. As shown in Figure 17, those with some form of cardiovascular disease are more likely to say they have had high blood pressure (63% vs. 21%), high blood cholesterol (58% vs. 26%), diagnosed diabetes (21% vs. 4%), are obese (28% vs. 19%), or that they did not meet recommendations for regular leisure time physical activity (58% vs. 44%). Notably, similar proportions of adults with and without cardiovascular disease report smoking and consuming less than 5 fruits and vegetables per day.

Intentions to Make Lifestyle Changes

High proportions of adults in the general population said they were trying to lower their risk of developing heart disease and stroke by eating fewer high fat or high cholesterol foods (69%), eating more fruits and vegetables (75%), or being more physically active (64%). Nearly half of all adults reported doing all three activities to reduce their risk; only 12% are making no lifestyle changes to reduce their risk.

Respondents were more likely to report *eating fewer high-fat or high cholesterol foods to reduce their risk of heart disease and stroke* if they were age 35 years or older, female, overweight or obese, or already had CVD or diabetes.

Those more likely to report *eating more fruits and vegetables to reduce their risk* included adults aged 50 years or older, females, and those already diagnosed with CVD or diabetes. They were also more likely to meet the recommended level of leisure time physical activity.

Respondents were more likely to say they were trying to *be more physically active to reduce their*

[6] Major risk factors for heart disease and stroke include high blood pressure, high blood cholesterol, diabetes; currently smoking cigarettes, and being obese (where obesity is defined as having a body mass index (BMI) ≥30.0 kg/m^2). Physical inactivity is only weakly associated with increased risk of heart disease, as is the insufficient consumption of fruits and vegetables associated with increased risk of obesity.

risk if they were already physically active during leisure time at the recommended level. People were also more likely to be more physically active to reduce their risk if they were overweight or obese, or if they had diabetes.

Advice from Healthcare Provider

Respondents to the BRFSS survey were asked whether their healthcare provider gave them advice regarding lifestyle changes to reduce cardiovascular disease risk.

About 16% of adult respondents said they were advised by their doctor, nurse, or other health professional to eat fewer high fat or high cholesterol foods, 20% were advised to eat more fruits and vegetables, and 23% were advised to be more physically active. Those with CVD were twice as likely to receive advice from their provider as those without CVD. Of those with CVD, 33% said they were advised by a healthcare provider to eat fewer high fat or high cholesterol foods, 41% were advised to eat more fruits and vegetables, and 44% were advised to be more physically active.

In addition to those with CVD, survey respondents were also more likely to say they received advice from a health professional about lifestyle changes if they were over age 50 years, did not meet current recommendations for leisure time physical activity, were obese or overweight, had diabetes, or had one or more risk factors for heart disease and stroke.

A limitation of these data is that it is unknown how many respondents saw a healthcare provider in the past year and had an opportunity to receive advice.

Compliance with Provider Advice

Adults surveyed were more likely to make lifestyle changes if they had been advised by a healthcare provider to do so. Respondents who received advice were more likely to eat fewer high fat or high cholesterol foods (83% compared to 67%) and to eat more fruits and vegetables (85% compared to 73%) than those who did not get this advice. Being more physically active to lower risk of heart disease and stroke was not affected by advice from a healthcare professional. About the same percentage (60%) of those who did and who did not receive healthcare provider advice reported being more physically active to lower their CVD risk.

In addition to following advice given by a healthcare provider, many people with CVD take aspirin regularly to reduce their risk of heart disease and stroke. Taking aspirin is not recommended in some cases; about 9% of survey respondents said they are unable to take aspirin due to a health problem or condition that makes taking aspirin unsafe for them. However, 30% of adults over age 35 years reported taking aspirin daily or every other day. Of those who take aspirin regularly, a majority said they take it to reduce chances of a heart attack (83%) or stroke (70%), and 24% said they take aspirin regularly for pain.

Discussion

In examining the data on CVD prevalence in Washington State, it should be remembered that estimates are based solely on reports of heart attack and stroke survivors, not accounting for those who died. Furthermore, certain biases inherent in self-reported data should be expected. According to the 2001 BRFSS survey, CVD affects approximately 7% of the adult population in Washington. About 6% had been told they had a heart attack or angina, and about 2% said they had had a stroke. This is on par with data from the National Health Interview Survey, which found that 6% of the U.S. adult population aged 18 years and older had been told they had heart disease (using the same definition as the BRFSS), and 2% had had a stroke. In Washington, CVD followed the national pattern for prevalence by sex and age: males were found to be at statistically significantly higher risk than females for CVD and diseases of the heart. The prevalence of CVD, particularly stroke, increased with increasing age.

On average, survey respondents with heart disease or stroke said it had been 10 years since their first heart attack and 7 years since their first stroke. Advances in medications and in clinical interventions have increased the length of survival after a heart attack or stroke. However, increased length of survival does not always equate with improved quality of life, nor with appropriate disease management. Also, because heart disease and stroke are leading causes of disability, it is important to consider the impact of having a greater number of people with established disease living longer. Their disability

has implications not only for themselves, but also their families, communities, and the state.

Controlling modifiable risk factors for CVD is an important step in preventing a recurrent heart attack or stroke for people living with the disease. Yet the prevalences of four major risk factors (hypertension, high blood cholesterol, diabetes and obesity) are statistically significantly higher in those with CVD compared to those who do not have the disease. The details surrounding risk factors, such as whether their hypertension or blood cholesterol is *currently* uncontrolled or was high only *prior* to the onset of disease, are unknown for these respondents. However, these data raise questions as to whether the risk factors that may have led to CVD, and which may lead to further events, are well controlled. For many people with CVD, participation in some type of rehabilitation (inpatient, outpatient, nursing home, or home health) following a heart attack or stroke can help the patient and family manage their risk factors and resulting disease.

The good news is that many adults in the general population said they were trying to lower their risk of developing heart disease and stroke by eating fewer high-fat or high-cholesterol foods, eating more fruits and vegetables, or being more physically active. People with CVD were even more likely to report an intention to make changes in nutritional habits compared to those without CVD. Respondents who were already physically active were more likely to say they were trying to reduce their CVD risk through eating more fruits and vegetables and being more physically active. It may be that those who have already established healthy patterns of behavior are more likely to increase those behaviors to further reduce their risk.

The advice of a physician or other health professional was influential in motivating people to make changes in their nutritional choices to reduce their risk; however, only a third of those with CVD said they had received counseling from their healthcare provider within the last year regarding nutrition and physical activity.

The American College of Cardiology (ACC) and the American Heart Association (AHA) have published a series of clinical practice guidelines for the management of various cardiovascular conditions. The *AHA/ACC Guidelines for Preventing Heart Attack and Death in Patients with Atherosclerotic Cardiovascular Disease: 2001 Update*, for example, focuses on secondary prevention for patients with coronary and other vascular disease. Recommendations delineated in these guidelines include pharmacologic interventions involving antiplatelet agents, blood pressure medication and lipid-lowering drugs, as well as lifestyle interventions to quit smoking, manage weight, adopt a heart-healthy diet and achieve recommended levels of physical activity. Recommendations for diabetes management include appropriate hypoglycemic therapy as well as modification of risk factors common to both CVD and diabetes (physical activity, weight, hypertension and lipid management).

Given the influence healthcare professionals have in changing CVD risk behavior among those who have the disease, a comprehensive heart disease and stroke prevention program may wish to explore strategies to promote health care providers' adherence to the guidelines that address both primary and secondary prevention of heart disease and stroke.

One venue for enhancing the incorporation of guidelines into clinical practice is the Washington State Collaborative (WSC). The WSC is a systematic, evidence-based approach to redesigning and improving the quality of healthcare for patients with chronic disease.

During the year-long quality improvement process, participating clinical teams identify small-scale changes based on the best available scientific knowledge. The clinical team tests the implemented change, evaluating the impact of the changes. Only the most effective strategies are adopted into routine practice. The WSC appears to be an effective mechanism for improved management of CVD and risk factors, in part, through implementation of the guidelines into routine clinical practice.

Chapter 3: Hospitalizations for Heart Disease and Stroke

This chapter presents utilization and charges associated with inpatient hospitalizations for CVD, and for CVD subcategories diseases of the heart and stroke. Hospitalization rates are presented by age and sex (but not by race or ethnicity, because these variables are not included in the dataset). Hospitalization rates of diseases of the heart, coronary heart disease (CHD, a further subcategory of diseases of the heart), and stroke are mapped by county. Finally, the discharge status associated with CVD-related hospitalizations is examined, with particular emphasis on hospitalizations that end in death or are referred to skilled nursing facilities. These analyses include *congestive heart failure*, one of the diseases of the heart subcategories. While congestive heart failure affects fewer people than coronary heart disease it represents significant burden in terms of costs and disability.

Data Source

Data presented in this chapter are based on analysis of the *Comprehensive Hospital Abstract Reporting Systems* (CHARS) database. This database includes Washington residents hospitalized in Washington between 2000 and 2002. The unit of analysis is *hospitalizations*, not people. Thus, if one person was hospitalized for CVD twice in a year, that person would count as two hospitalizations.

CHARS data represents inpatient hospitalizations only, and therefore does not capture the burden of CVD related to outpatient procedures, such as some cardiac catheterizations or stent placements.

In CHARS, the first-listed diagnosis (sometimes called the *principal diagnosis*) is considered to be the principal reason the patient was admitted to the hospital. There are up to eight other diagnosis fields for additional conditions that contributed to being hospitalized. In order to capture a broader picture of CVD hospitalization burden, data presented in this chapter include all instances of CVD-related hospitalizations, except where use of CVD as first-listed diagnosis is noted. Complete data for CVD hospitalizations by *first-listed diagnosis* and *any diagnosis* are provided in the Data Appendix.

CVD Hospitalizations

Based on any diagnosis listed at discharge, cardiovascular disease (CVD) accounted for nearly four out of every 10 hospitalizations for Washington residents in 2002. During that year 214,601 out of 562,297 hospitalizations included CVD among the nine possible diagnoses listed at discharge. Among CVD hospitalizations, 66% were for diseases of the heart and stroke accounted for 12%.

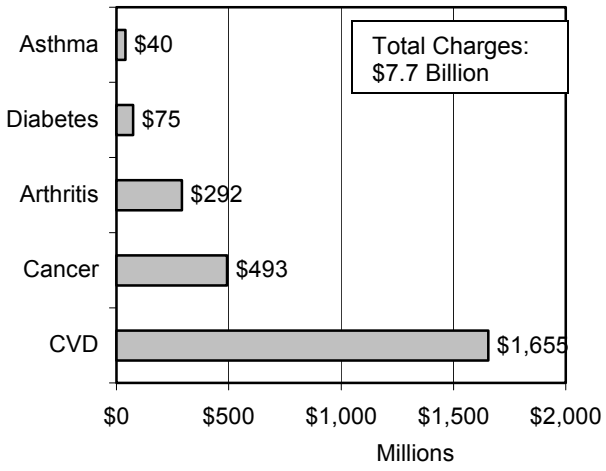
Table 2 shows the number of hospitalizations that included a diagnosis of CVD or its subcategories, diseases of the heart and stroke. Also shown are charges and length of stay associated with each hospitalization. CVD accounted for over one million days of hospitalization in 2002. Patients hospitalized with CVD had a longer average length of stay than patients hospitalized for other conditions. Patients with stroke had a slightly longer average length of stay than patients with diseases of the heart. However, the average charge per day for diseases of the heart hospitalizations was higher than the average charge per day for stroke hospitalizations.

In 2002, more than half of $7.7 billion in hospitalization charges to Washington residents were due to CVD hospitalizations (Table 2). Total charges for CVD hospitalizations amounted to $4.1 billion.

Table 2. Hospitalizations for CVD, Diseases of the Heart, and Stroke, Washington 2002

	All Hospitalizations	Hospitalizations for CVD	Hospitalizations for Diseases of the Heart	Hospitalizations for Stroke
Total Number	562,297	214,601	142,055	25,311
Total Charges in billions of dollars	$7.7	$4.1	$2.9	$0.5
Average charge/day	$3,351	$3,936	$4,213	$3,120
Average charge/hospitalization	$13,650	$18,853	$20,394	$18,480
Range of charges/hospitalization	$18 to $1,495,691	$57-$1,495,691	$57 to $1,495,691	$153 to $1,102,940
Total Hospital Days	2,290,563	1,027,801	687,666	149,893
Average Length of Stay	4.1 days	4.8 days	4.8 days	5.9 days

Figure 18. Hospital Charges* for Major Chronic Diseases in Washington State, 2002



* Based on first-listed diagnosis

Figure 18 compares charges for CVD hospitalizations with charges for other major chronic conditions. For hospitalizations among Washington residents in 2002, charges for CVD as the first-listed diagnosis ranged from three times higher than cancer charges to forty times higher for asthma charges.

Hospitalizations for Diseases of the Heart

In 2002 there were 142,055 hospitalizations that included a diagnosis of diseases of the heart (Table 2) for a rate of 24.9 hospitalizations per 1,000 total population.

Hospitalizations for diseases of the heart accounted for 687,666 days of hospitalization and comprised 38% of all hospital charges.

As shown in Table 3, hospitalization rates for diseases of the heart increased with increasing age, from 2 per 1,000 in the 0-44 year age group to 274.4 per 1,000 for those over the age of 85 years.

Age-adjusted hospitalization rates for diseases of the heart for males were 37% higher for males than females, a statistically significant difference.

Hospitalizations for Stroke

In 2002 there were 25,311 hospitalizations (Table 2) that included a diagnosis of stroke in 2002, for a rate of 4.5 per 1,000 total population.

Hospitalizations for stroke accounted for 149,893 days of hospitalization and comprised about 6% of hospitalization charges.

Stroke hospitalization rates increased with increasing age, from 0.3 per 1,000 for those in the 0-44 year age group to 52.8 per 1,000 for those over the age of 85 years (Table 3).

Age-adjusted hospitalization rates for stroke for males were 22% higher for males than females, a statistically significant difference.

Table 3. Hospitalization Rates for Diseases of the Heart and Stroke by Age and Sex, Washington 2002

	Diseases of the Heart Rate per 1,000 (95% CI)	Stroke Rate per 1,000 (95% CI)
Total	24.9 (24.8, 25.1)*	4.5 (4.4, 4.5)*
Age Group		
0-44	2.0	0.3
45-64	23.0	3.5
65-84	129.5	24.5
85+	274.4	52.8
Sex		
Males	29.4 (29.2, 29.6)*	5.0 (4.9, 5.1)*
Females	21.5 (21.3, 21.6)*	4.1 (4.0, 4.2)*

* Age Adjusted Rates

CVD Hospitalizations by County

Figures 19, 20, and 21 display age-adjusted hospitalization rates for any discharge diagnosis of diseases of the heart, coronary heart disease and stroke for 2002. Hospitalization rates are displayed by the county of residence, regardless of whether the patient attended a hospital in that county or elsewhere. (See Technical Notes for data sources, methods and limitations of data used in these maps.)

The hospitalization rate per 1,000 total population for diseases of the heart ranged from 13 for Skamania County to 40 for Grays Harbor County (Figure 19).

Coronary heart disease (CHD, a subcategory of diseases of the heart) hospitalizations per 1,000 total population ranged from 6 in Skamania County to 23 in Grays Harbor County (Figure 20.)

Figure 19. Hospitalizations with Diseases of the Heart
Washington State Residents, 2000-2002

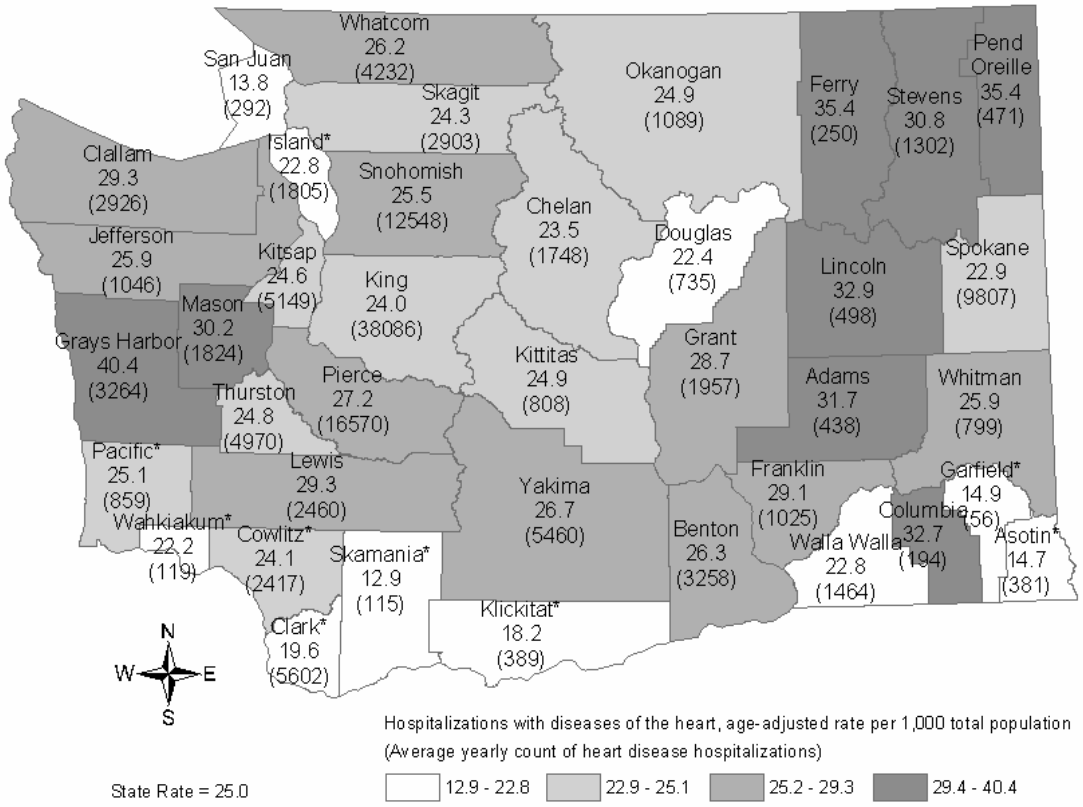
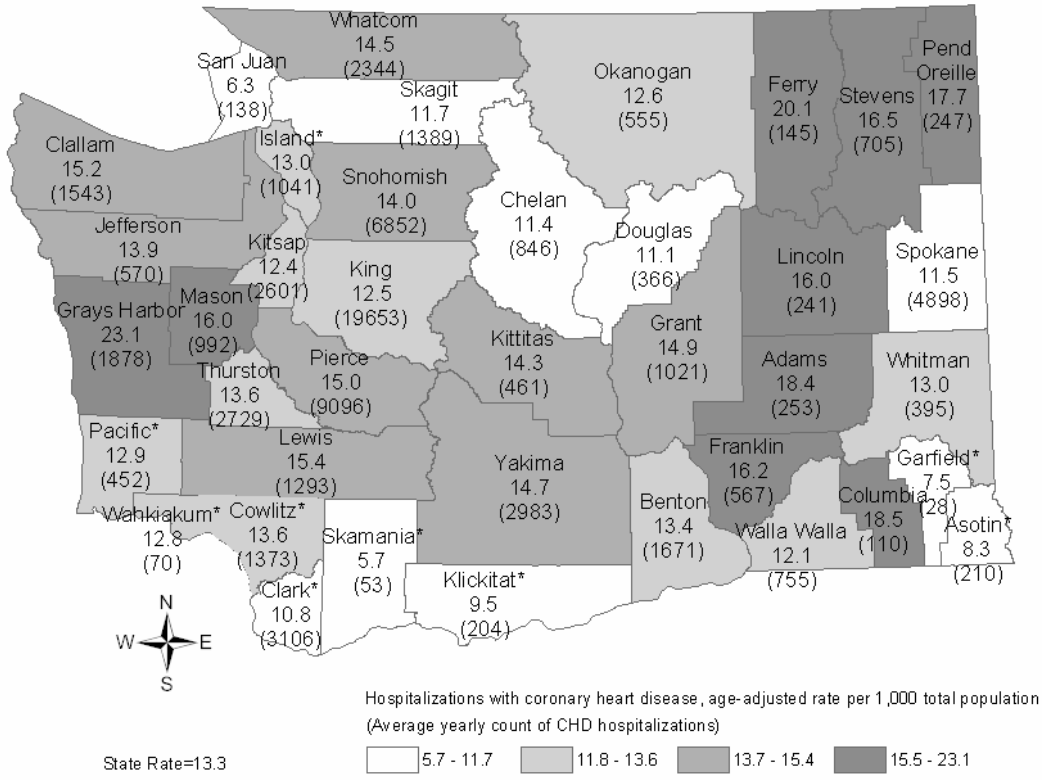
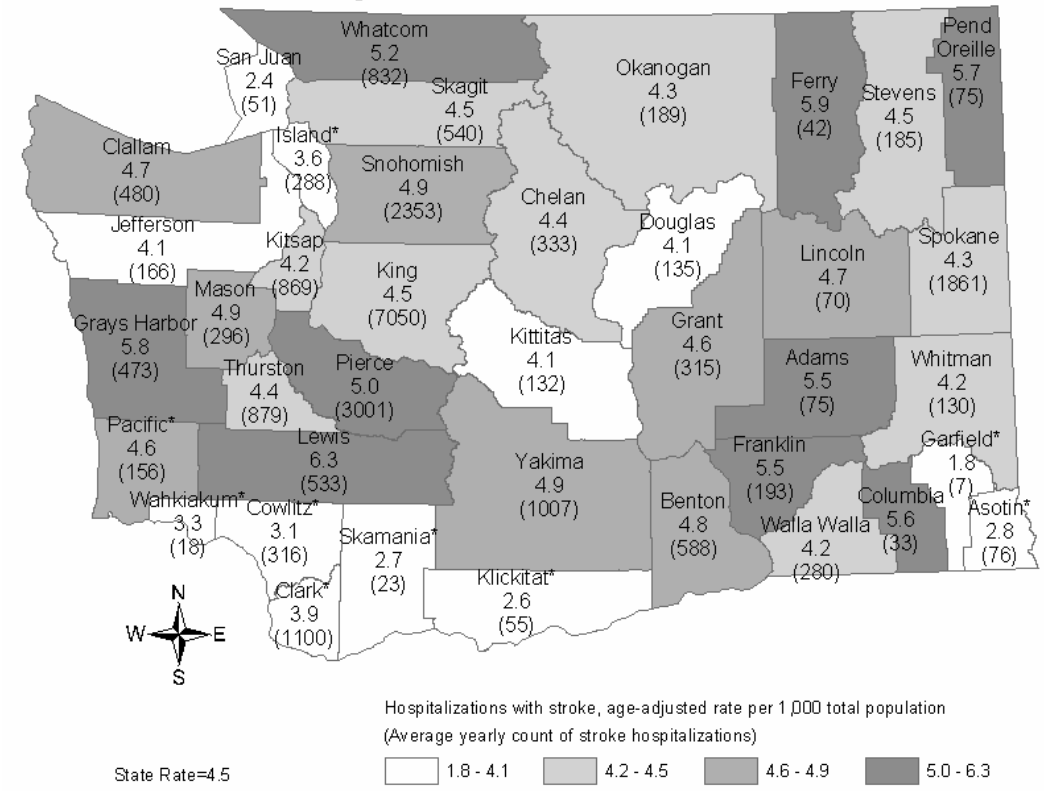


Figure 20. Hospitalizations with Coronary Heart Disease
Washington State Residents, 2000-2002



*Caution should be used when interpreting county rates for Island County, where a large proportion of people use military hospitals, and for the border counties Asotin, Garfield, Clark, Cowlitz, Klickitat, Pacific, Skamania and Wahkiakum, where a large proportion of people may use hospitals in Oregon or Idaho.

Figure 21. Hospitalizations with Stroke
Washington State Residents, 2000-2002



The stroke hospitalization rate per 1,000 total population ranged from 2 in Garfield County to 6 in Lewis County (Figure 21).

Skamania ranked lowest in rates for diseases of the heart and coronary heart disease. Both Grays Harbor and Ferry counties ranked in the top 3 for rates of hospitalization for heart disease, coronary heart disease, and stroke.

Discharge Status

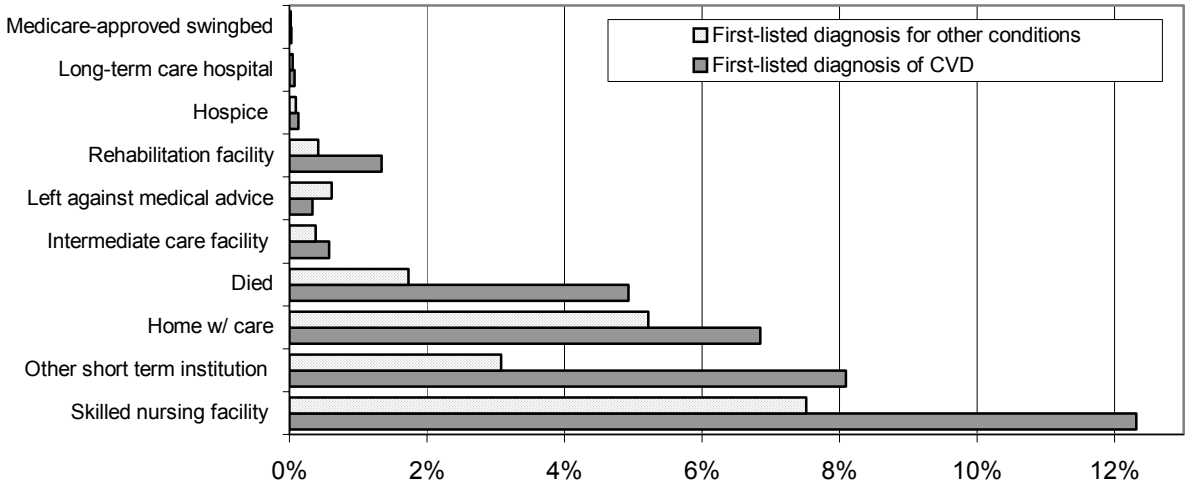
Most patients return to their homes for self-care after they are discharged from the hospital; this is considered routine care. While the majority of CVD hospitalizations are discharged to routine care, patients with CVD as the first-listed diagnosis are less likely than those hospitalized for other conditions to have a routine discharge (65% compared to 81%). Aside from routine discharge, a number of other things may happen following a hospitalization, as shown in Figure 22. Some patients return to their homes despite medical advice to go elsewhere; others die while still hospitalized. Patients may also be discharged to home with care, to a skilled nursing facility; or other short term hospital or institution for inpatient care. The same general pattern shown in Figure 22 is observed for the CVD subcategories of coronary heart disease and stroke (see Data Appendix for discharge status statistics for these conditions.)

Aside from routine discharge to self-care at home, patients are next most likely to be discharged to a skilled nursing facility (SNF). The highest proportion of discharges to skilled nursing facilities occurred among patients with any diagnosis of stroke or congestive heart failure (24% and 16%, respectively). Discharges to SNF are discussed in more detail on page 21.

Patients hospitalized for CVD were more likely than those hospitalized for other conditions to die during their hospital stay. The highest proportion of deaths during hospitalization occurred among patients with a first-listed diagnosis of stroke (9%). See page 21 for a more detailed discussion of CVD hospitalizations that end in death.

*Caution should be used when interpreting county rates for Island County, where a large proportion of people use military hospitals, and for the border counties Asotin, Garfield, Clark, Cowlitz, Klickitat, Pacific, Skamania and Wahkiakum, where a large proportion of people may use hospitals in Oregon or Idaho.

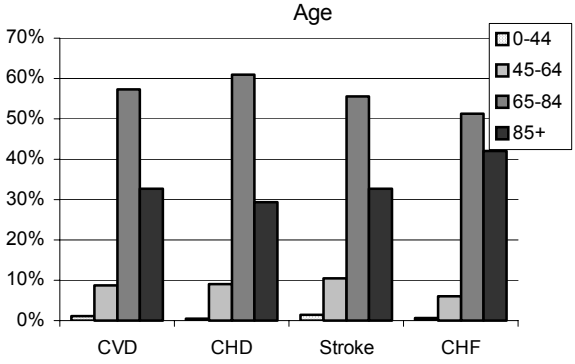
Figure 22. Discharge Status of CVD Hospitalizations vs Other Hospitalizations, Washington 2002



Discharge to Skilled Nursing Facilities by Age and Sex

Discharges to skilled nursing facilities (SNF) varied by age and sex for several CVD-related conditions. Figure 23 displays the proportion of CVD hospitalizations in Washington in 2002 that were discharged to skilled nursing facilities by age group.

Figure 23. Proportion of CVD-Related Discharges* to Skilled Nursing Facilities by Age



*According to the first-listed diagnosis listed at discharge.

Among hospitalizations with a first-listed diagnosis of CVD, older adults were more likely than younger adults to be discharged to an SNF. Around 57% of these discharges were among those aged 65-84 years and around 33% among age 85 years or older. This pattern was also observed for hospitalizations in which the first-listed diagnosis was coronary heart disease, stroke, or congestive heart failure.

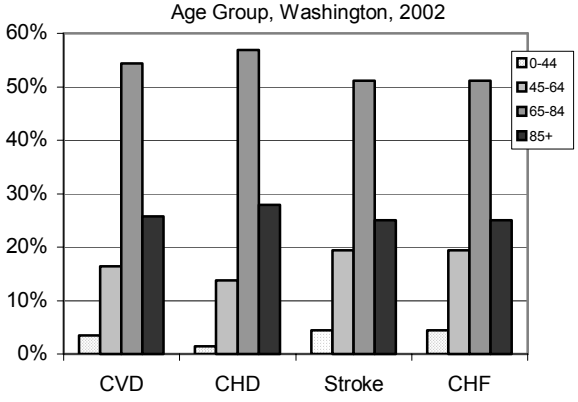
Women were statistically significantly more likely than men to be discharged to a SNF following hospitalization for cardiovascular-related conditions (CVD, coronary heart disease, stroke, and congestive heart failure). Around 60% of discharges to SNF for CVD, stroke, and congestive heart failure occurred among females compared to about 40% of males. A smaller difference between the proportion of females and males discharged to SNF was found for coronary heart disease (55% and 45%, respectively).

Deaths Following CVD Hospitalization by Age and Sex

The proportion of deaths that occurred during hospitalization varied by age for several cardiovascular-related conditions. Compared to adults under age 65, a higher proportion of deaths occurred among adults aged 65 and older who were hospitalized for CVD, coronary heart disease, stroke, and congestive heart failure. Around 55% of these deaths occurred among patients aged 65-84 years and 26% occurred among those aged 85 years or older.

There were only slight variations by sex in the proportion of deaths that occurred during hospitalizations for coronary heart disease and stroke. A slightly higher proportion of deaths during hospitalization for *coronary heart disease* occurred among men. Conversely, a higher proportion of deaths during hospitalization for *stroke* occurred among women.

Figure 24.CVD-Related* Hospitalization Deaths by Age Group, Washington, 2002



*According to the first-listed diagnosis listed at discharge.

Discussion

Cardiovascular disease represents a significant portion of all hospitalizations. In 2002, nearly four out of ten hospitalizations involving Washington residents listed CVD as one of nine possible discharge diagnoses. CVD was listed as a main reason, or as a contributing reason, for over 1 million days of hospital stay in 2002.

Over half of hospitalization charges among Washington residents in 2002 involved CVD, amounting to a total of 4.1 billion dollars. The average charge per day was higher for diseases of the heart hospitalizations than for stroke hospitalizations; this may be due to more costly interventional procedures and days of stay in the intensive care unit that are required following a heart attack.

Hospitalization rates increased with increasing age for both coronary heart disease and stroke. Hospitalization rates were highest for those over the age of 85 years. Both coronary heart disease and stroke hospitalization rates were significantly higher for males than for females.

Because the unit of analysis was *hospitalizations*, not *people*, we were unable to determine how many repeat hospitalizations occurred among people hospitalized for CVD-related conditions, compared to those hospitalized for other conditions.

The hospitalization rate per 1,000 total population for diseases of the heart ranged from 13 in Skamania County to 40 in Grays Harbor County. Coronary heart disease hospitalizations per 1,000 total population ranged from 6 in Skamania County to 23 in Grays Harbor County. Stroke-related hospitalizations per 1,000 total population ranged from 2 in Garfield County to 6 in Lewis County. Both Grays Harbor and Ferry counties ranked among the top counties for hospitalizations related to heart disease, coronary heart disease, and stroke. The true burden of CVD hospitalizations may be underestimated in counties such as Skamania, which borders another state, because Washington residents who are hospitalized in neighboring Idaho and Oregon are not captured in this analysis. To assess the true burden to Washington residents of border counties, it may be helpful to combine data from neighboring states with Washington data in the analysis.

The contiguous eastern counties of Pend Oreille, Stevens, Ferry, Lincoln, Adams, Franklin, and Columbia all had high rates of hospitalization for coronary heart disease. Explaining this apparent clustering would require further analysis, to take into account factors such as the prevalence of CVD-related conditions in the county.

Compared to other conditions, hospitalizations for major cardiovascular disease, coronary heart disease, stroke, and heart failure were less likely to have a routine discharge to home care. CVD-related hospitalizations were more likely to be discharged to a skilled nursing facility than hospitalizations for other conditions.

Patients hospitalized for CVD-related conditions were also more likely to die than patients hospitalized for other conditions. Death following hospitalization for CVD-related conditions was more likely among older patients. Men were more likely than women to die following hospitalization for coronary heart disease. Conversely, women were more likely than men to die following hospitalization for stroke.

It is helpful to remember that the hospital is one element within a system that hopes to improve outcomes in those with CVD. With improved management of risk factors and of the disease, as described in Chapters 1 and 2, hospitalization rates and charges could decrease. It has been suggested that mortality rates from heart attack while hospitalized are lower in those hospitals that follow established treatment guidelines;[7] further analysis could examine if this is the case also for stroke and congestive heart failure.

[7] Peterson ED, Parsons LS, Pollack CV, et al. Abstract 3557 presented at AHA Scientific Sessions November 2002.

Chapter 4. Mortality due to Heart Disease and Stroke

This chapter focuses on the impact of cardiovascular disease (CVD) deaths in Washington State. CVD includes two of the top ten contributors to mortality in Washington and in the nation: heart disease (currently the leading cause of death) and stroke (currently the third leading cause of death).

The rates of death for major CVD, and the CVD subcategories coronary heart disease (CHD) and stroke are presented, as well as rates by age, race, and sex, and trends over time. Mortality rates for diseases of the heart, coronary heart disease and stroke are mapped by county. The chapter concludes with an examination of the location where death occurred, and examines people's knowledge of the signs and symptoms of heart disease and stroke.

Data Source

The Vital Statistics database includes information from death certificates that were used in the analysis of CVD mortality. This analysis includes instances of deaths that list CVD as the primary cause of death. Rates were age-adjusted to the 2000 U.S. population, based on U.S. census population denominators. Death rates by race were based on the racial category listed on the death certificate, and three years' data were combined to minimize instability of the estimate due to small sample size. Please see the Technical Appendix for more information on methods used in the analyses presented in this chapter.

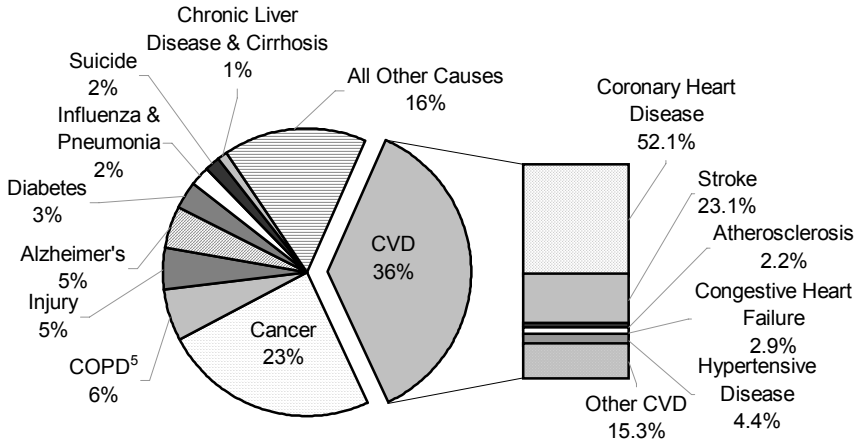
CVD Mortality

Cardiovascular disease deaths are the largest contributor to all-cause mortality, comprising more than a third of all deaths. During 2002, there were 16,046 CVD deaths in Washington out of 45,244 total deaths (Figure 25). Within the CVD category, there were 11,117 deaths due to diseases of the heart, (8,305 of these deaths were due to coronary heart disease) and 3,757 deaths due to stroke. (Note that the category *diseases of the heart* includes coronary heart disease, hypertensive disease and congestive heart failure, as well as some conditions within "Other CVD" in Figure 25). Washington rates of CVD-related deaths compared to the U.S. are presented on page 26 under "Mortality Trends".

Mortality by Sex

Overall, males have a higher rate of CVD death than women. In 2002, the age adjusted CVD mortality rate for males was 343 deaths per 100,000, nearly 50% higher than rate for females, 236 deaths per 100,000. For coronary heart disease, the 2002 death rate for males (200 deaths per 100,000) was twice the death rate for females (105 deaths per 100,000). Stroke mortality for males (67 deaths per 100,000) in 2002 was on par with stroke mortality for females (65 deaths per 100,000).

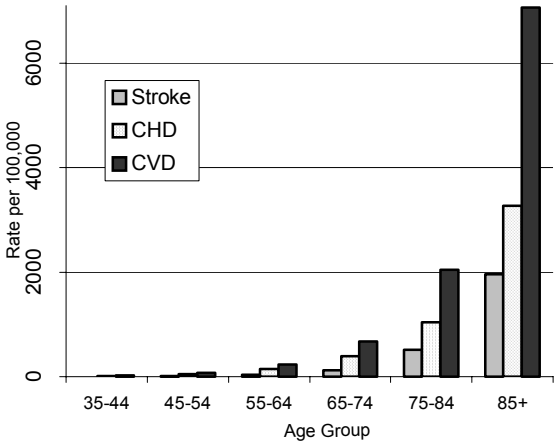
Figure 25. Leading Causes of Death, Washington, 2000-2002



Mortality by Age Group

Figure 26 displays mortality rates by age group for CVD, coronary heart disease, and stroke. Age-specific mortality rates for CVD, coronary heart disease and stroke displayed similar patterns of increasing death rates in successively older age groups

Figure 26. CVD Death Rates by Age Groups, Washington State Residents, 2002



Mortality by Age and Sex

Males and females demonstrate a similar pattern of increasing rates of CVD mortality with increasing age group (Figure 27). However, the rate of male deaths is statistically significantly higher than the rate of female deaths for each group.

Like CVD mortality, coronary heart disease death rates increase with increasing age (Figure 28). Coronary heart disease death rates were statistically significantly higher for males compared to females in each age group.

Stroke mortality also increased with increasing age (Figure 29). Unlike the pattern of death rates by age for other CVD and coronary heart disease, there were no significant difference in stroke death rates for males and females in any age group.

Figure 27. CVD Mortality
Washington State Residents
by Age and Sex, 2000-2002

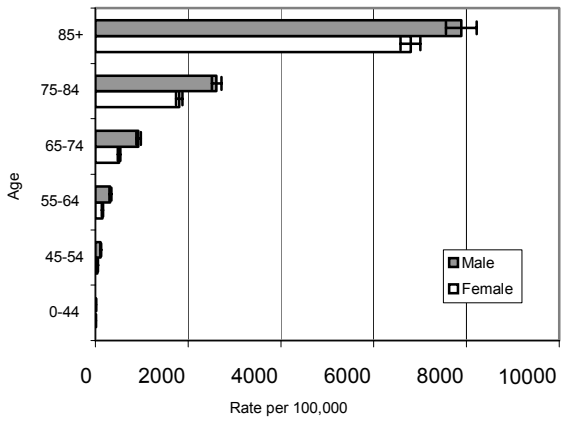


Figure 28. Coronary Heart Disease Mortality
Washington State Residents
by Age and Sex, 2000-2002

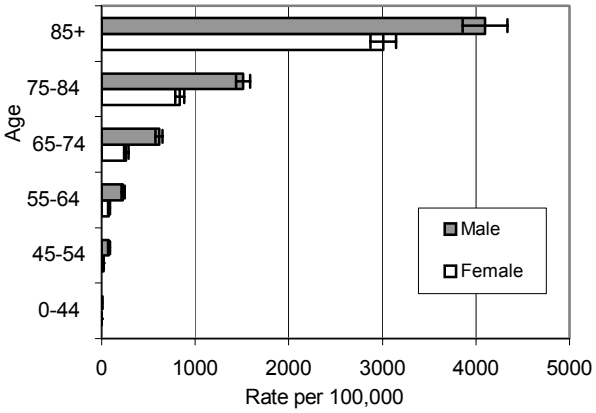
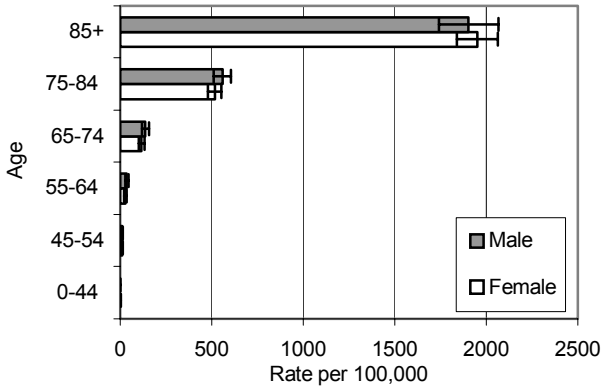


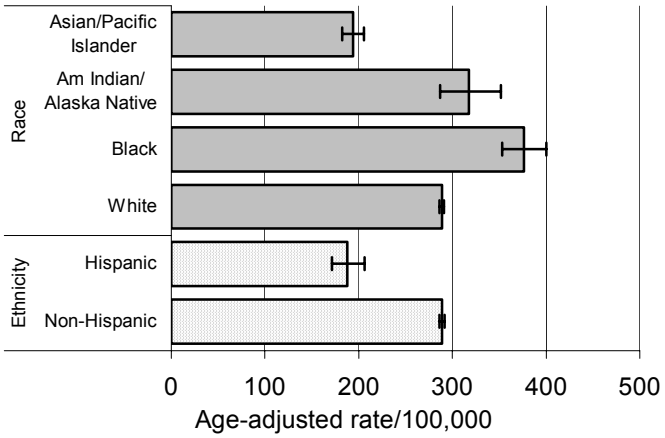
Figure 29. Stroke Mortality
Washington State Residents
by Age and Sex, 2000-2002



Mortality by Race and Ethnicity

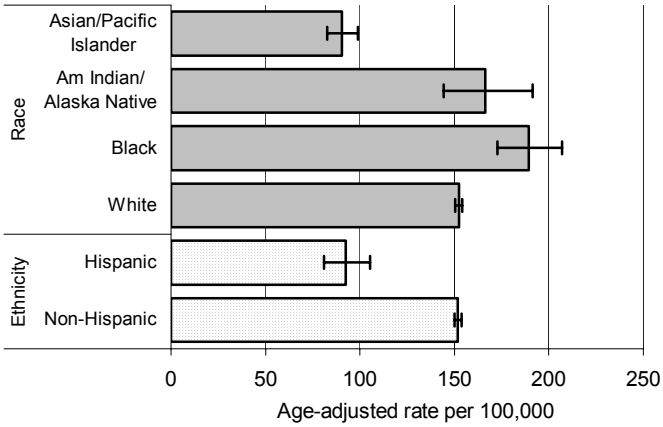
Compared to whites, age-adjusted CVD death rates for 2000–2002 combined were higher among African Americans and lower among Asians & Pacific Islanders (Figure 30). Rates for Hispanics were significantly lower than rates for non-Hispanics.

Figure 30. CVD Death Rates by Race & Ethnicity
Washington State, 2000-2002



Age-adjusted death rates from coronary heart disease for 2000–2002 combined were higher among African Americans and lower among Asians and Pacific Islanders compared to whites (Figure 31). Rates were also lower among Hispanics compared to non-Hispanics. Coronary heart disease death rates by race and ethnicity in Washington were lower than the corresponding rates in the nation as a whole, with the exception of American Indians and Alaska Natives in Washington, who appear to have a higher rate than the rate for this group nationally (166 deaths per 100,000 and 118 deaths per 100,000, respectively).

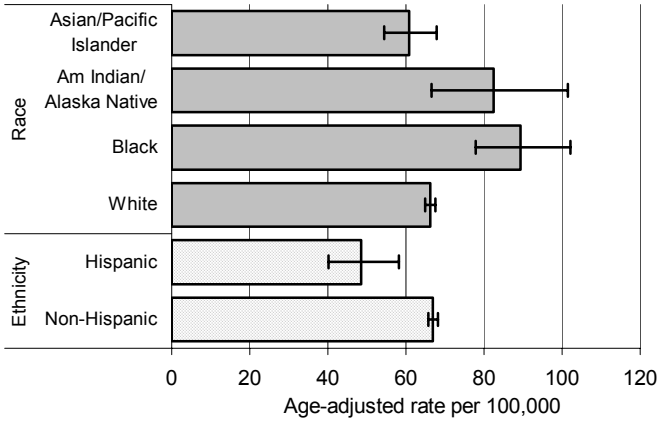
Figure 31. Coronary Heart Disease Mortality Rates
By Race and Ethnicity
Washington State, 2000-2002



Compared to whites and Asians & Pacific Islanders, stroke deaths rates for 2000-2002 combined were higher among African Americans and American Indians and Alaska Natives (Figure 32). Stroke death rates were lower among Hispanics compared to non-Hispanics.

In all racial categories, Washington's stroke death rates appeared higher than those of the nation. In the nation as a whole, the stroke death rate for American Indians and Alaska Natives (41 deaths per 100,000) was lower than that in all other racial groups in 2001. However, American Indians and Alaska Natives in Washington had a stroke death rate (82 deaths per 100,000) that was twice the national rate for this racial group. It was also higher than the Washington stroke death rate of whites (66 deaths per 100,000) and nearly equal the African American rate (89 deaths per 100,000).

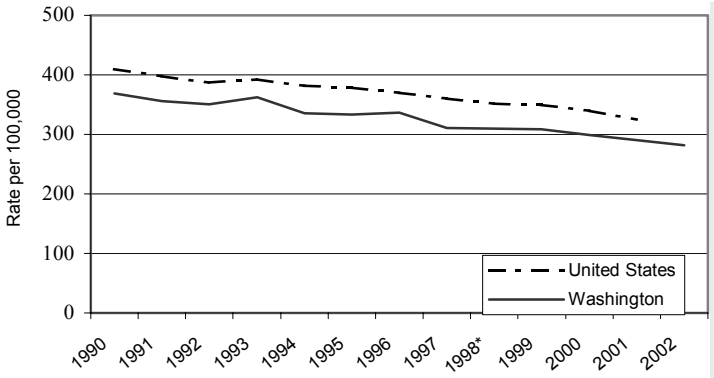
Figure 32. Stroke, Mortality Rates
By Race and Ethnicity
Washington State, 2000-2002



Mortality Trends

Between 1990 and 2002, the age-adjusted CVD death rates declined for both Washington and the U.S. (Figure 33). CVD mortality in Washington decreased by about 2% per year between 1990 and 2002. The age-adjusted CVD death rate in Washington was lower than that of the U.S. in 1990 and has remained so over the past decade. Most recently, the Washington age-adjusted death rate for CVD was 282 per 100,000 population (2002) while the U.S. rate was 325 per 100,000 (2001).

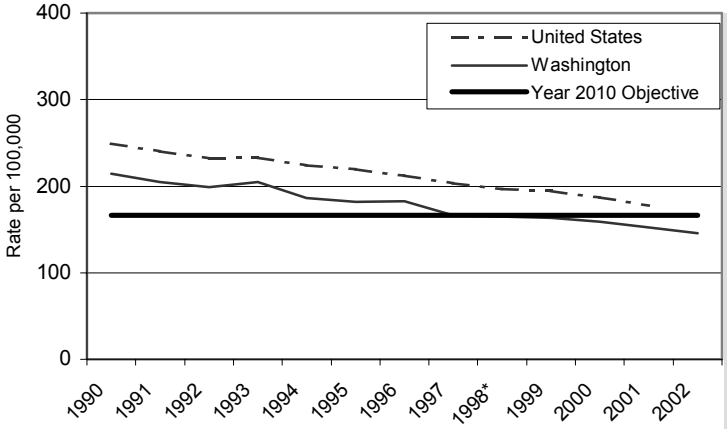
Figure 33. CVD Mortality,
Washington State Residents and United States, 1990-2002



Data Source: Washington State Department of Health Death Files, 1990-2002 and CDC Wonder 1990-2001. Query system. U.S. and Washington causes of death were coded with ICD-9 codes 390-434,436-448 and ICD-10 codes I00-I78. Washington data are age-adjusted to the U.S. 2000 standard population

Between 1990 and 2002, age-adjusted coronary heart disease death rates decreased for the U.S. and for Washington, (by about 3% per year; see Figure 34). The coronary heart disease death rate in Washington has remained lower than that of the U.S. over the past decade. Most recently, the coronary heart disease mortality was 148 per 100,000 population in Washington (2002) compared to 178 per 100,000 in the U.S. (2001). In 1998, the Washington rate of coronary heart disease deaths dipped below the Healthy People 2010 Objective of 166 deaths per 100,000, and has continued to decline.

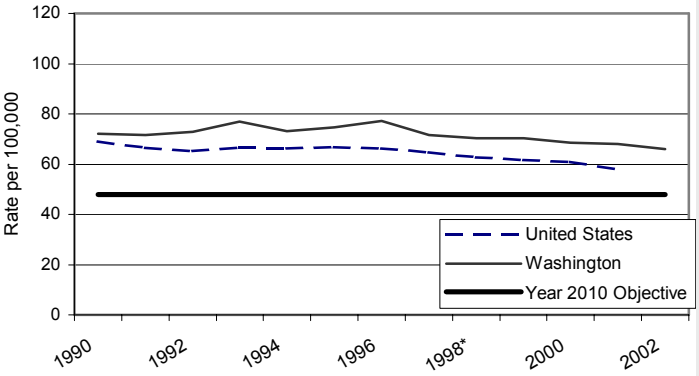
Figure 34. Coronary Heart Disease Mortality
Washington State Residents and United States, 1990-2002



Data Source: Washington State Department of Health Death Files 1990-1992 and CDC Wonder Query system. U.S. and Washington casues of death were coded with ICD-9 codes 410-414, 429.2 and ICD-10 codes I20-I25. Washington data are age-adjusted to the U.S. 2000 standard population.

Between 1990 and 2002, age-adjusted stroke mortality decreased in the U.S. and in Washington (by 2% per year between 1996 and 2002, see Figure 35). Washington stroke mortality was 66 per 100,000 population (2002), which is higher compared to the U.S. rate of 58 per 100,000 (2001). Based on 2002 data, the rate of stroke deaths will have to decrease by 27% in order to meet the Healthy People 2010 Objective of 48 deaths per 100,000.

Figure 35. Stroke Mortality
Washington State Residents and United States, 1990-2002



Data Source: Washington State Department of Health Death Files, 1988-2002 and CDC Wonder Query system. U.S. and Washington casues of death were coded with ICD-9 codes 430-434,436-438 and ICD-10 codes I60-I69. Washington and HP2010 data are age-adjusted to the U.S. 2000 standard population

* Because the International Classification of Disease coding system was updated in 1999, mortality rates using ICD-9 codes (1998 and earlier) were adjusted to allow for comparison with mortality rates using ICD-10 (1999 and later).

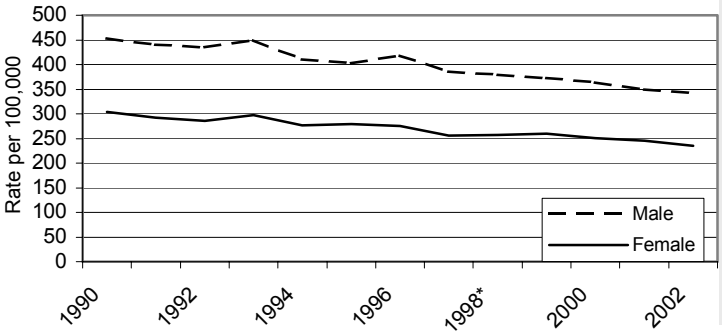
Trends in Mortality by Sex

In 2002, the CVD death rate for males was 343 deaths per 100,000, 1.5 times the CVD death rate for females (236 deaths per 100,000). Between 1990 and 2002, the age-adjusted CVD death rate declined by about 2% for males and females (Figure 36).

In 2002, the rate of death due to coronary heart disease for males was 200 deaths per 100,000, nearly twice the rate of death for females (105 deaths per 100,000). Age-adjusted coronary heart disease rates declined between 1990 and 2002 for both males and females (Figure 37), with a similar rate of decrease for both sexes (about 3% per year).

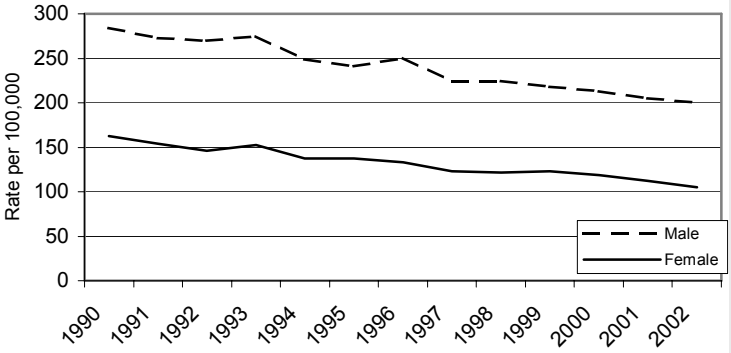
Figure 38 displays similar rates of stroke death for males and females in 2002, (67 deaths per 100,000 for males and 65 deaths per 100,000 for females). The pattern of small difference in stroke death rates by sex was observed throughout the period from 1990 to 2002. Male stroke deaths decreased slightly between 1990-2002, at a rate of 0.9% per year. For females there was a non-significant increase in death rates between 1990 and 1995. Between 1995 and 2002, however, female stroke death rates decreased by 2.8% per year. However, the apparent difference in the annual decline in stroke deaths for men and women between 1995 and 2002 was not significant.

Figure 36. Age-adjusted CVD Mortality Rates by Sex, Washington State Residents, 1990-2002



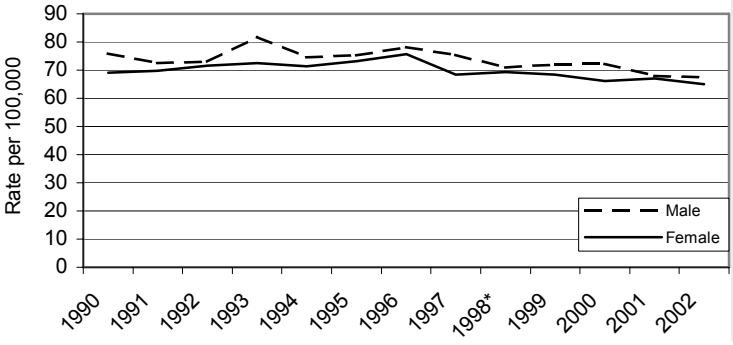
Data Source: Washington State Department of Health Death Files, 1990-2002. Causes of death were coded with ICD-9 codes 390-434,436-448 and ICD-10 codes I00-I78. Data are age-adjusted to the U.S. 2000 standard population

Figure 37. Trends in Age-adjusted Coronary Heart Disease Mortality, by Sex, Washington State Residents 1980-2002



Data Source: Washington State Department of Health Death Files, 1990-2002. Causes of death were coded with ICD-9 codes 410-414, 429.2 and ICD-10 codes I20-25. Data are age-adjusted to the U.S. 2000 standard population

Figure 38. Age-adjusted Stroke Mortality Rates by Sex, Washington Residents, 1990-2002



Data Source: Washington State Department of Health Death Files, 1990-2002. Causes of death were coded with ICD-9 codes 430-434,436-438 and ICD-10 codes I60-I69. Data are age-adjusted to the U.S. 2000 standard population

* Because the International Classification of Disease coding system was updated in 1999, mortality rates using ICD-9 codes (1998 and earlier) were adjusted to allow for comparison with mortality rates using ICD-10 (1999 and later).

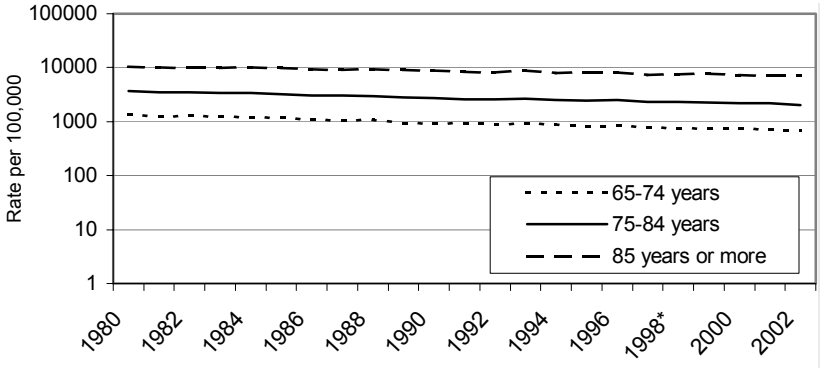
Trends in Mortality by Age [8]

Between 1980 and 2002 people aged 85 and older had the highest rates of death throughout the period, yet had the smallest annual percent decrease, just 1.8% per year (Figure 39). CVD death rates for people between age 75 and 84 years decreased by 2.5% per year, and rates for those between 65 and 74 decreased by 3.0% per year.

Age-adjusted coronary heart disease death rates also decreased among older age groups between 1980 and 2002 (Figure 40). People age 85 and older had the highest death rates and the smallest percent decrease (2.8% per year, on average). Death rates for people between age 75 and 84 years and rates for those between 65 and 74 decreased by slightly more than 3% per year.

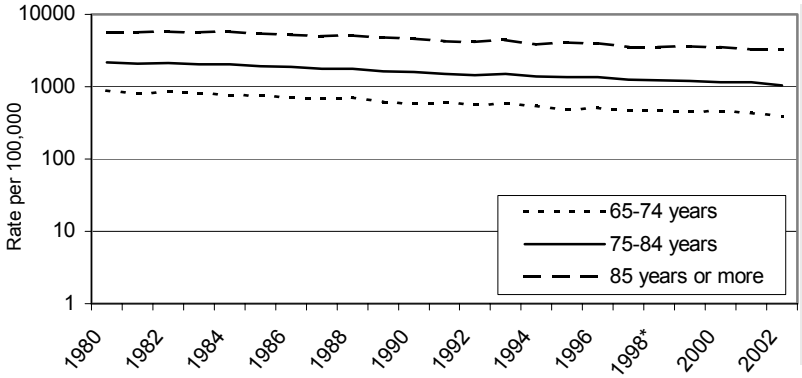
Between 1980 and 2002 stroke mortality for people age 85 and older decreased significantly by 0.6% per year between 1982 and 2002 (Figure 41). For people aged 75 to 84 years, stroke deaths decreased by 4% per year between 1980 and 1990, and by 2% per year between 1996 and 2002. Rates for those aged 65 to 74 years decreased by 5% per year between 1980 and 1989, followed by a much slower decline of 1% per year between 1989 and 2002.

Figure 39. Age-specific CVD Death Rate, Adults over 65 Years
Washington State Residents, 1980-2002



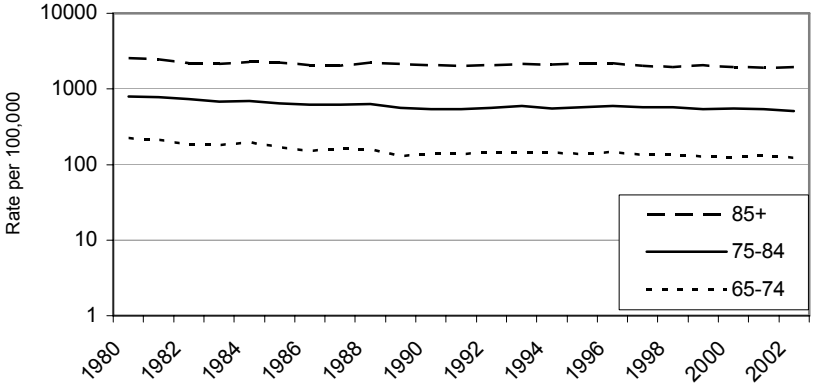
Data Source: Washington State Department of Health Death Files, 1980-2002. Causes of death were coded with ICD-9 codes 390-434,436-448 and ICD-10 codes I00-I78.

Figure 40. Age-specific Coronary Heart Disease Death Rate, Adults over 65 Years, Washington State Residents, 1980-2002



Data Source: Washington State Department of Health Death Files, 1980-2002. Causes of death were coded with ICD-9 codes 410-414,429.2 and ICD-10 codes I20-I78.

Figure 41. Age-specific Stroke Death Rate, Adults over 65 years,
Washington State Residents, 1980-2002



Data Source: Washington State Department of Health Death Files, 1980-2002. Causes of death were coded with ICD-9 codes 430-434,436-438 and ICD-10 codes I60-I69.

[8] Note: The graphs comparing trends in age-specific rates among older age groups are presented on a logarithmic scale, in order to compare rates that differ greatly in magnitude (e.g. rates for age 85+ are in the thousands, while rates for age 65-74 are in the hundreds.

Mortality Rates by County

Figure 42 displays the average age-adjusted mortality rates for coronary heart disease (CHD) by county. For 2000-2002 combined, the average age-adjusted CHD mortality rate for Washington State was 152 deaths per 100,000. The highest CHD death rates in the state occurred in Adams, Ferry, Grant, Grays Harbor, Lewis, Pacific, Pierce, Stevens, and Wahkiakum counties. Although CHD rates have been declining overall, four counties experienced an increase in CHD mortality between 1996-1998 and 2000-2002: Adams, Chelan, Stevens, and Whitman (Figure 43).

Figure 44 displays the average age-adjusted mortality rates for stroke by county. For 2000-2002 combined, the average age-adjusted stroke mortality rate for Washington State was 68 deaths per 100,000. The highest stroke death rates in the state occurred in Cowlitz, Clark, Douglas, Franklin, Grays Harbor, Lewis, Pierce and Walla Walla counties. While stroke rates have been declining overall, four counties experienced an increase in stroke mortality between 1996-1998 and 2000-2002: Douglas, Klickitat, San Juan and Whitman (Figure 45).

Figure 42. Age-Adjusted Coronary Heart Disease Mortality Rate, Washington State Residents, 2000-2002

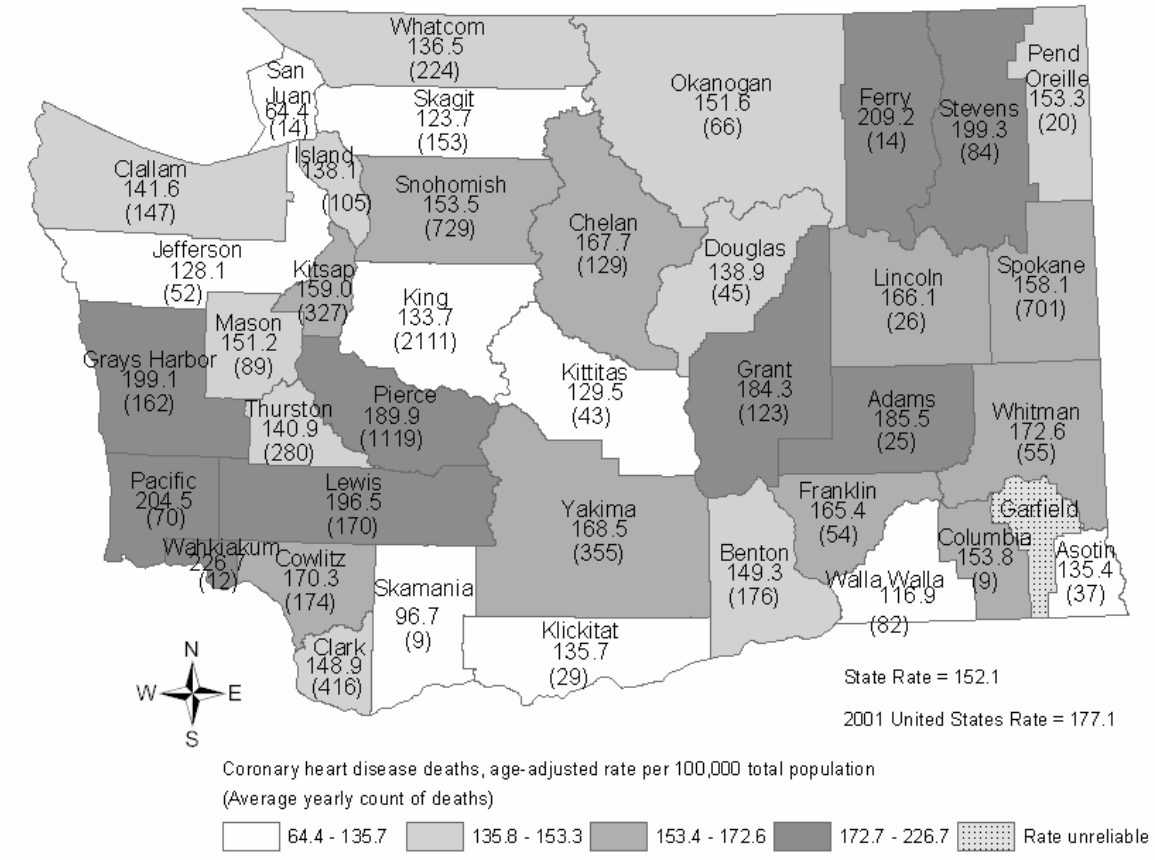


Figure 43. Percent Change in Age-Adjusted Coronary Heart Disease Mortality Rate, Washington State Residents, 1996-1998 to 2000-2002

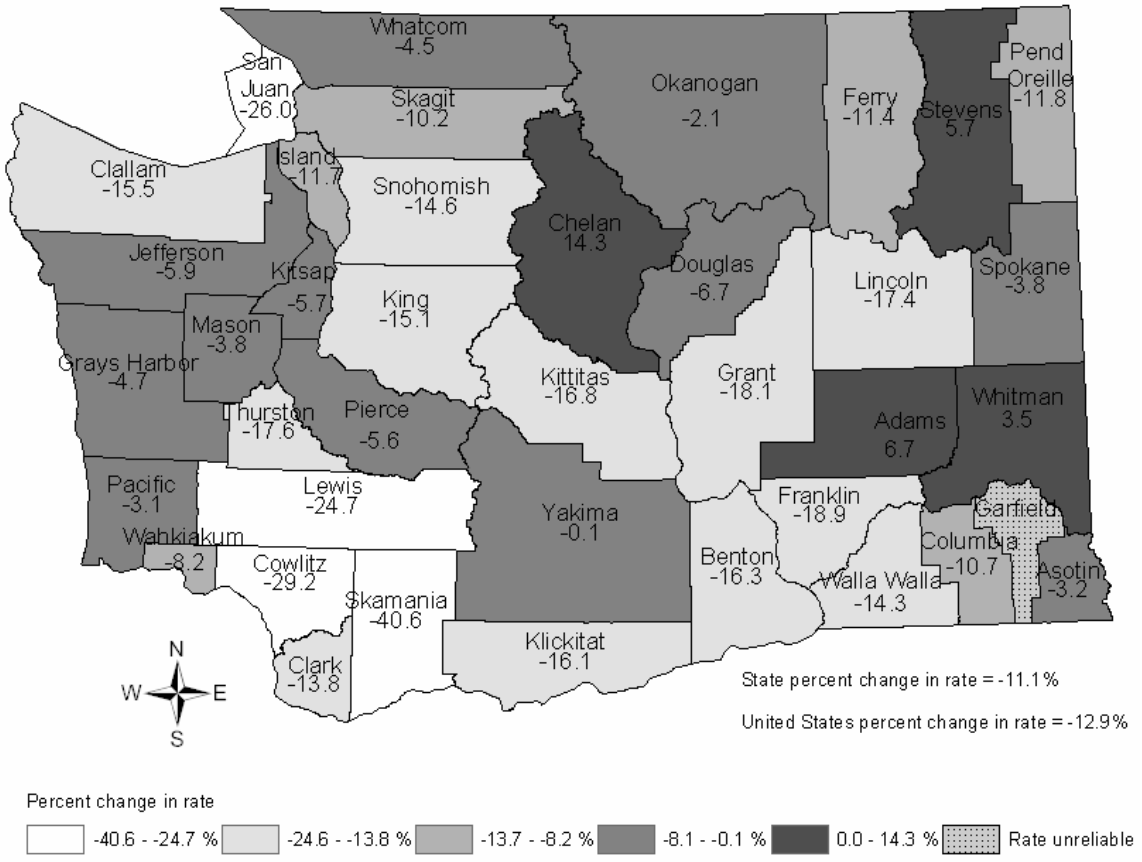
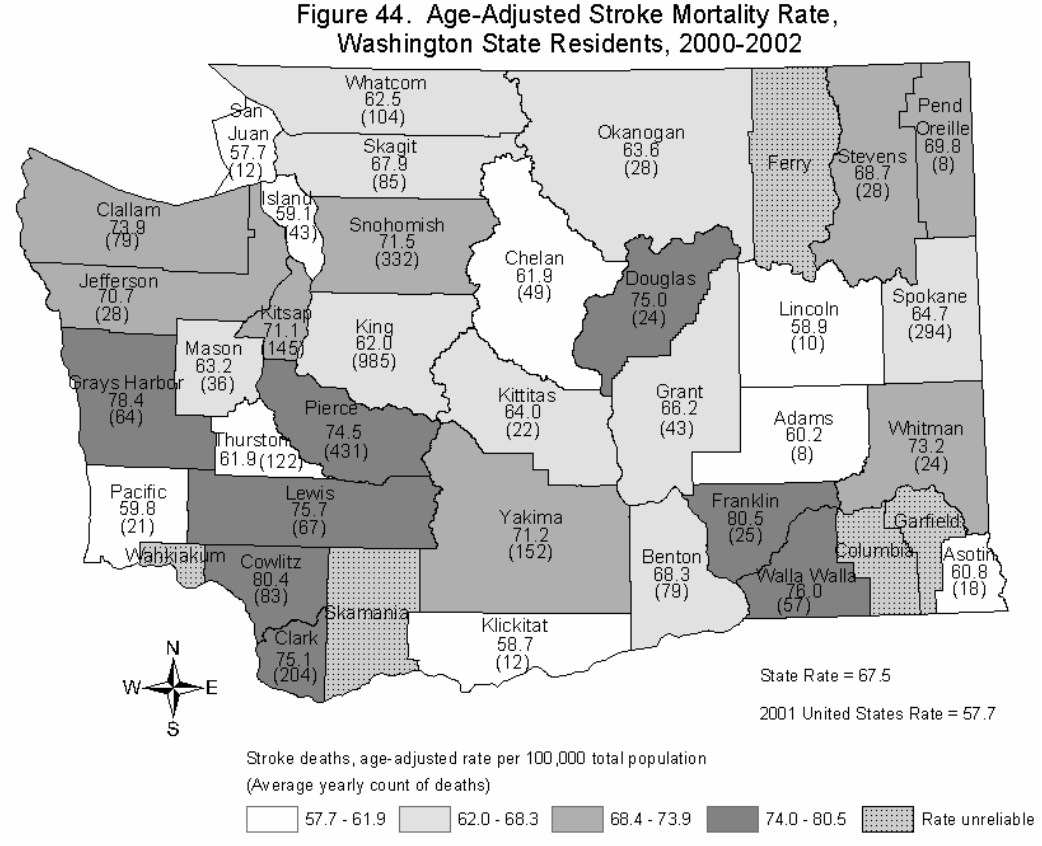
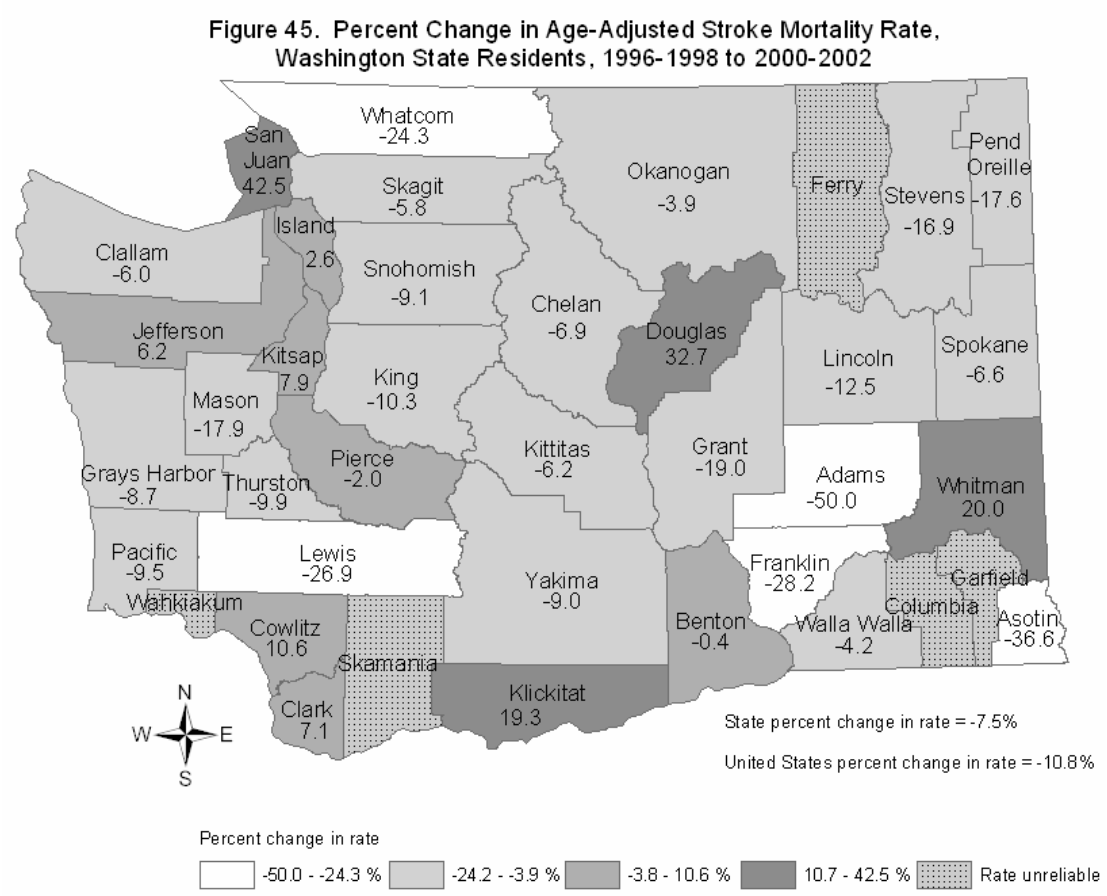


Figure 44. Age-Adjusted Stroke Mortality Rate, Washington State Residents, 2000-2002





Location of Death

As part of this report we included a comparison of cardiac deaths[9] by location at death for the years 2000-2002 (Table 4). Using death certificate data, the location of death was reviewed for those deaths that occurred either in transport, or after arriving at a hospital or emergency room. In addition, we examined pre-transport deaths, defined as those deaths that occurred in the following places: home, other place, and nursing home.

The age-adjusted rate for cardiac death was higher in the pre-transport group (126 deaths per 100,000) compared to any other location at death. Nearly two-thirds of CVD deaths occurred prior to transport to a medical facility, either at home, in a nursing facility, or other location. Deaths that occurred at home accounted for the largest portion of pre-transport deaths and hospitals accounted for the largest proportion of deaths occurring after transport. Only a few people died in transport (on average, 13 per year). Cardiac deaths in the emergency room accounted for 5% of all cardiac deaths.

Table 4. Location of Cardiac Death, 2000-2002

Location	Percent	Age-Adjusted Rate per 100,000	[95% CI]
Hospital	33.3	68.0	(65.8,70.2)
Emergency Room	4.5	9.0	(8.2,9.8)
In Transport	0.1	0.2	(0.1,0.4)
Total Pre-Transport	62.1	126.0	(123.1,128.9)
Home	30.9	62.7	(60.6,64.8)
Other Place	5.2	10.4	(9.5,11.2)
Nursing Home (includes hospice)	26.0	53.0	(51.1,54.9)

Knowledge of Signs and Symptoms of Heart Disease and Stroke

Quick and appropriate response to heart attack and stroke has demonstrated effectiveness in reducing CVD mortality. Successful intervention

[9] Defined as death from cardiac disease (ICD-10 codes: I00-I09, I11, I13, I20-151, and Q20-Q24)

depends not only on the quality of the Emergency Medical Team response, but also on the ability of an individual, family and friends to recognize the signs and symptoms of a heart attack and stroke and quickly call for emergency care.

Knowledge among the general public about the signs and symptoms of heart attack and stroke was assessed in the 2002 Washington BRFSS. Respondents were asked whether they thought various symptoms were indicators of a heart attack. Most people were able to correctly identify chest pain or discomfort (97%); shortness of breath (90%); and pain or discomfort in the arms of shoulder (90%) as symptoms of a heart attack. Fewer identified feeling weak, lightheaded or faint (69%); and pain or discomfort in the jaw, neck, or back (52%) were heart attack symptoms. More than a third incorrectly thought that sudden trouble seeing in one or both eyes was a symptom of heart attack.

When asked about stroke signs and symptoms, the majority of respondents correctly identified sudden numbness or weakness of face, arm or leg, especially on one side (95%); confusion or trouble speaking (89%); and sudden trouble walking, dizziness or loss of balance (89%) as symptoms of a stroke. Fewer identified sudden trouble seeing in one or both eyes (71%); and severe headache with no known cause (61%) as a symptom of stroke. More than a third incorrectly thought that sudden chest pain was a stroke symptom.

When asked what they would do if they thought someone was having a heart attack or stroke, most respondents correctly said that the best thing to do was call 9-1-1(90%).

Discussion

Deaths due to coronary heart disease, stroke and CVD overall decreased in Washington State over the past decade. In 2002, the rates of CVD and coronary heart disease mortality were lower in Washington than the nation as a whole. In addition, coronary heart disease mortality has met the Healthy People 2010 Objective. In contrast, the 2002 Washington stroke death rate was above that of the nation, and the Healthy People 2010 Objective had not been met. Currently, Washington State has the ninth highest stroke mortality rate in the nation.

Males had rates of death from CVD and coronary heart disease that were, respectively, 1.5 to 1.9 times higher than those for women, a pattern that has not changed over the past decade despite decreases in mortality rates for both sexes. The rate of stroke death for males and females was similar, and has decreased only slightly over the past decade.

Mortality rates for CVD, coronary heart disease and stroke increase with increasing age group, with the highest rates among people over age 85 years. However, the greatest percent decrease in rates of CVD, coronary heart disease and stroke over the past two decades occurred among people ages 65-74, followed by those ages 75-84, and finally those over age 85 years.

Both CVD and coronary heart disease deaths were higher in Blacks, and lower in Asian Americans and Pacific Islanders compared to whites. CVD and coronary heart disease mortality was lower in Hispanics compared to non-Hispanics. Blacks and American Indians and Alaska Natives had higher rates of death due to stroke than whites.

Swift response on the part of the emergency medical system is a key strategy for reducing CVD mortality rates. This analysis showed that nearly two-thirds of CVD deaths occurred prior to transport to a medical facility, either at home, in a nursing facility, or other location. According to the Washington BRFSS, most people are aware of the key signs and symptoms of heart attack and stroke, and know to call 9-1-1 in case of a CVD event. However, efforts to reinforce awareness of heart attack and stroke signs and symptoms, as well as the appropriate first aid, should continue. Secondary prevention efforts should also include initiatives to strengthen the availability and quality of appropriate care, and response time of emergency medical response to lower the risk of death due to CVD.

References

Bensley L, Van Eenwyk J, Bruemmer BA. Measuring fruit and vegetable consumption: providing serving size information doubles estimated percent eating five per day. *Journal of the American Dietary Association.* 2003;103:1530-1532.

Pearson TA, Blair ST, Daniels SR, et al. American Heart Association guidelines for primary prevention of heart disease and stroke, 2002 update. *Circulation* 2002;106:388-391.

Smith SC, Blair SN, Bonow RO, et al. AHA/ACC guidelines for preventing heart attack and death in patients with atherosclerotic cardiovascular disease: 2001 update. *Circulation* 2001;104:1577-1579.

U.S. Department of Health and Human Services. *A Public Health Action Plan to Prevent Heart Disease and Stroke.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2003.

U.S. Department of Health and Human Services. *Healthy People 2010.* 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC : U.S. Government Printing Office, November 2000.

Washington State EMS and Trauma Steering Committee. *State of the State: Emergency Cardiovascular Care in Washington State.* Nov 15 2002.

Glossary

These definitions are taken from *A Public Health Action Plan to Prevent Heart Disease and Stroke,* published by CDC in 2003.

Blood cholesterol is the blood concentration of a family of lipid or "fatty" molecular compounds obtained directly from the diet or produced in the body from fatty dietary components. It is a necessary factor in the development of atherosclerosis; total blood cholesterol concentration is classified as "high" if it is greater than or equal to 200 mg/dL.

Cardiovascular disease (CVD) refers to any of the any of the disorders that affect the circulatory system. This includes coronary heart disease, congestive heart failure, and stroke.

- **atherosclerosis** is a pathological condition affecting the medium-sized and larger arteries, especially those that supply the heart (the coronary arteries), the brain (the carotid and cerebral arteries), and the lower extremities (the peripheral arteries), as well as the aorta. Atherosclerosis underlies the occurrence of heart attacks, many strokes, peripheral arterial disease, and dissection or rupture of the aorta.

- **congestive heart failure** (CHF), also known as heart failure, is an impairment in the pumping function of the heart due to heart disease. It often leads to physical disability and increased risk of additional cardiovascular events.

- **coronary heart disease** (CHD) is caused by impaired circulation in one or more coronary arteries. It is often diagnosed following chest pain (angina pectoris) or a heart attack. CHD is the most common type of cardiovascular disease; over 50% of CVD deaths are due to CHD.

- **diseases of the heart** is based on the International Classification of Diseases (ICD) codes and includes coronary heart disease, congestive heart failure, and others. Importantly, this does not include atherosclerosis or cerebrovascular disease (stroke). (See the figure in the introduction for a graphic depiction of the subtypes of major cardiovascular diseases, with corresponding ICD codes.)

- **heart disease** refers to any affliction that impairs the structure or function of the heart (e.g., atherosclerotic and hypertensive diseases, congenital heart disease, rheumatic heart disease, and cardiomyopathies).

- **stroke,** also known as cerebrovascular disease, or a brain attack, is the interruption of blood supply to the brain due to either an obstruction or rupture of a blood vessel. Stroke that is not fatal often leads to some level of physical and/or cognitive disability

High blood pressure is a condition in which the pressure in the arterial circulation is elevated. It is associated with increased risk for heart disease, stroke, chronic kidney disease, and other conditions. Blood pressure is considered "high" if systolic pressure (measured at the peak of contraction of the heart) is greater than or equal to 140 mm Hg or if diastolic pressure (measured at the fullest relaxation of the heart) is greater than or equal to 90 mm Hg.

Hypertension: see *high blood pressure*

Modifiable characteristics are factors related to CVD risk that are amenable to change (e.g., diet, physical activity, smoking), in contrast to those that are intrinsic to the individual (e.g., age, sex, race, genetic traits).

Primary CVD prevention refers to a set of interventions, including the detection and control of risk factors, designed to prevent the first occurrence of heart attack, heart failure, or stroke among people with identifiable risk factors.

Secondary CVD prevention refers to a set of interventions aimed at survivors of acute CVD events (e.g., heart attack, heart failure, stroke) or others with known CVD in which long-term case management is used to reduce disability and risk for subsequent CVD events.

Stroke, also known as cerebrovascular disease, or a brain attack, is the interruption of blood supply to the brain due to either an obstruction or rupture of a blood vessel. Stroke that is not fatal often leads to some level of physical and/or cognitive disability.

Technical Appendix

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Technical Appendix

Data Sources

1. Cardiovascular Disease Prevalence and Risk

The ***State of Washington Behavioral Risk Factor Surveillance System (BRFSS)*** is a large, continuously conducted, telephone health survey that enables the Center for Disease Control and Prevention (CDC), state health departments, and other health agencies to monitor modifiable risk factors for chronic diseases and other leading causes of death. Self-reported BRFSS data are gathered from a randomly selected sample of adults living in households with telephones. Interviews, conducted by a survey firm under contract to DOH, follow protocols for survey administration that have been established by the Centers for Disease Control and Prevention (CDC). Computer-assisted interviewing is used to minimize errors by interviewers. The questionnaire includes core questions used by all states and questions on topics of specific interest to Washington. Data used in this report represent English-speaking adults age 18 years and older in households with telephones.

a. Key elements analyzed:
The following information about cardiovascular disease was obtained from BRFSS data for this report:

- health-risk behaviors (smoking, physical inactivity, nutrition) & health conditions that increase risk for CVD (diabetes, obesity, high blood pressure, and high cholesterol)
- prevalence of cardiovascular disease-related conditions (including heart disease and stroke),
- use of preventive services (cardiac rehabilitation);
- knowledge about health-related behaviors (heart attack and stroke signs and symptoms); socio-demographic characteristics and health status of adults with CVD (age, sex, race, ethnicity, physical and mental health, and activity limitation due to poor health);
- characteristics of persons with history of heart attack or stroke (age at first diagnosis); prevention (including self-management activities such eating more healthily, being more active, regular aspirin use, and receiving advice from health professional to lower risk of developing heart disease and stroke).

b. Definitions of select indicators:

Cardiovascular disease: includes respondents who reported ever being told by a doctor, nurse, or other health professional that they had a heart attack, angina, coronary heart disease, or stroke.

Heart disease: includes respondents who reported ever being told by a doctor, nurse, or other health professional that they had a heart attack, angina, or coronary heart disease.

Stroke: includes respondents who reported ever being told by a doctor, nurse, or other health professional that they had a stroke.

Obese: Body Mass Index $\geq$30.0 kg/m^2, as calculated from self-report heights and weights.

Insufficient leisure time physical activity: includes respondents who DID NOT get at least 30 minutes of moderate physical activity on five or more days a week, or at least 20 minutes of vigorous activity on three or more days a week.

c. Estimates:
Estimates (rates and percents) are weighted to reflect distribution by age and sex of the population from which the sample was drawn. Numerator cell sizes less than 10 and denominator cell sizes less than 50 are suppressed. Caution should be used in interpreting numerator cell sizes between 10 and 30. In this report three years of data were combined when necessary to obtain adequate sample sizes for select subpopulation analyses (e.g., for analysis by race and ethnicity).

d. Trends:
Age standardized percentage estimates were used for analysis of trends in CVD-related conditions and select risk factors, to allow comparisons over time that are independent of differences in age structure.

e. Designation of race and ethnicity:
BRFSS respondents were asked to identify their race and ethnicity by answering two questions: "Are you Hispanic or Latino/a?" and "Which one or more of the following would you say is your race? White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian, Alaska Native or something else?" Respondents are then asked, "Which one of these groups would you say best represents your race?" Before 2000, only one race was recorded. Beginning in 2000, up to five races can be recorded and a preferred race selected. In this report, respondents were categorized according to their preferred race.

f. Additional caveats:
- The response rate in Washington for the BRFSS has changed from 61% in 1995 to 44% in 2000. Similar changes have been seen in all other states and in other telephone surveys. The drop is due to a combination of people being less willing to cooperate, exclusive use of cell phones instead of land lines, and technology that allows people to screen phone calls. CDC has assessed the impact of low response rates and has concluded that a response rate between 30% and 80% does not in itself introduce bias into the results.
- BRFSS may under-represent poorer, more mobile, and some racial and ethnic populations because they are less likely to live in homes with telephones or fewer households speak English. For example, based on 1990 census data, the mean income for household with telephones was $37,613 and the mean income for households without telephones was $15,650. Moreover, 3.1% of whites did not have a phone compared to 8.3% of non-whites.
- BRFSS data in this report represents only those people who speak English.
- BRFSS does not represent people who live in institutions.
- The characteristics of people who refuse to participate are unknown.
- Health risk behavior might be underestimated because people might be reluctant to report behaviors that others might not find acceptable.
- Use of preventive services might be underestimated because of recall error.

- Methods used to collect statewide data result in a sample that is in some cases too small to allow for the analysis of certain subpopulations (e.g., by racial/ethnic groups, or for certain counties).

National BRFSS data can be found at http://www.cdc.gov/brfss/index.htm. However the national trend data are not age-standardized.

2. Cardiovascular disease-related hospitalizations

The ***Comprehensive Hospital Abstract Reporting Systems (CHARS)*** provides data on inpatient stays for all patients treated in state-licensed acute care hospitals in Washington on an annual basis. CHARS does not include visits to emergency rooms, outpatient surgery, outpatient clinics, psychiatric, military and Veteran's Administration hospitals,[1] free-standing surgeries, mental health, substance abuse, and rehabilitation centers, and birthing centers. Hospitals collect data by abstracting information from the uniform billing form. They then code each diagnosis and procedure, and submit data to the state CHARS contractor by tape, cartridge, or electronic file transfer within 45 days of the end of the month. Diagnoses associated with each hospitalization are coded according to the International Classification of Disease, Clinical Modification of the Ninth Revision (ICD-9-CM).

The *principal diagnosis* is the first-listed diagnosis, considered to be the main reason the patient was admitted to the hospital.[2] Beginning in 1993, up to eight other diagnoses may be listed for additional conditions that had an effect on the hospitalization. On a quarterly basis, hospitals certify that the number of discharges and hospital charges are 95% correct. A number of DOH studies have verified the accuracy of CHARS data.

a. Number of hospitalizations: Information on the number of cardiovascular-related hospitalizations is obtained through analysis of CHARS data by discharge diagnoses. Information about the following cardiovascular disease related conditions are presented throughout the report:

- *major cardiovascular disease* (ICD-9 diagnosis code 390-448),
- *diseases of the heart* (ICD-9 diagnosis codes 390-398, 402, 404, 410-429),
- *coronary* (or ischemic) heart disease (ICD-9 codes 410-414, 429.2), and
- *stroke* (ICD-9 codes 430-434, 436-438).

b. Definition of Terms:

Length of stay: Total hospital days, average length of stay (total length of stay days divided by total number hospital discharges), and range for the length of stay were derived for select diagnoses.

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[1] This has a great impact on Island County due to the large proportion of residents connected with the military

[2] In this report, analyses are based upon the first-listed diagnosis as well as upon any listed diagnosis. In measuring the burden of CVD, it is important to look at hospitalizations in which CVD was a contributing factor, as well as hospitalizations in which CVD was the principal reason for hospitalization.

Hospital Charges: Total charges, average charge per day (total charges divided by total hospital days with known charge information), average charge per discharge (total charges divided by total number of hospital discharges with known charge information), and range of charges per discharge were derived for select diagnoses. Charges derived from CHARS do not include ancillary charges (e.g., anesthesiology, etc.). The majority of charges from Group Health are also excluded. Discharges with zero charges (i.e., cases where the payor did not report a charge) were omitted from the analysis. Charge information also tends to be inflated, compared to what was actually paid, since it only represents the amount billed to the payor.

Discharge status: Patient discharge status was summarized for select diagnoses. Both case-fatality and discharge to skilled nursing facilities were analyzed by age and sex. The discharge status field in CHARS is very well populated since it is a mandatory reporting field in the discharge record. Several Medicare code edits also make the data entered in this field more accurate.

c. Additional caveats:

- Information on the race and ethnicity of hospitalized patients is not collected in the CHARS database.
- Data in this report represents the number of hospitalization *events* each year, not the number of *patients*. A patient with cardiovascular disease could account for more than one hospitalization in a year. The number of hospitalizations gives us a better picture of the public health impact of a condition. Each hospitalization for an illness or injury is an adverse event for the person who experiences it. Many hospitalizations are potentially avoidable through reductions in the factors that cause diseases and injuries or through early detection and rapid treatment.
- CHARS does not contain data on Washington residents hospitalized outside of Washington. This situation affects border counties, especially those adjacent to larger population centers in other states. For example, Asotin and Garfield counties are particularly affected by hospitalizations in Idaho, and Clark County is affected by hospitalizations in Oregon.
- Patient residence is based on five-digit ZIP codes, using US postal service conventions that assign ZIP codes to counties based on the physical location of the post office. When ZIP codes cross county borders, some hospitalizations are assigned to the wrong county. This phenomenon may be most important for Skamania County. ZIP code 98671 includes a large portion of Skamania, but all hospitalizations in that ZIP code are assigned to Clark County. Other counties are less affected, because the number of hospitalizations that are potentially assigned to the wrong county is a relatively small proportion of the total hospitalizations for that county.
- National hospital discharge data can be found at http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm. However, comparable cardiovascular disease-related discharge rates were not available nationally to compare with rates presented in this report.

3. Cardiovascular Disease Deaths

The **Death Certificate System** provides annual information on all deaths in Washington and those of Washington residents who die in other states; estimated 99% complete. Demographic information is gathered by the funeral director; cause of death is reported by the attending physician or the coroner/medical examiner. Instruction manuals are provided to physicians, coroners, and medical examiners, as well as local health jurisdictions and others involved in completing and managing death certificates. The certificate is filed with the local health jurisdiction, retained for about 60 days for local issuance purposes, then filed with DOH. Classification and coding of data on Washington death records follow the National Center for Health Statistics (NCHS) guidelines as defined in *Vital Statistics Instruction Manuals* parts 1-20 (Published by US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Health Statistics, Hyattsville MD). Causes of death are coded according to the International Classification of Disease, World Health Organization, Ninth Revision (ICD-9) for 1979-1998; Tenth revision (ICD-10) for 1999 and later. Edits and a physician query system are used to check for internal consistency and logic/completeness of cause of death.

***a. Number of deaths*:** Information on cardiovascular deaths is obtained through analysis of the Death Certificate System by underlying cause of death for Washington State residents. Information about the following cardiovascular disease related deaths are presented throughout the report:

Disease category	ICD-9 (used 1979-1998)	ICD-10 used 1999-present)
Major cardiovascular disease	ICD-9 codes 390-434, 436-448	ICD-10 codes I00-I78
Diseases of the heart	Not used in this report	ICD-10 codes I00-I09, I11, I13, I20-I51
Coronary (or ischemic) heart disease	ICD-9 codes 410-414, 429.2	ICD-10 codes I20-I25
Stroke	ICD-9 codes 430-434, 436-438	ICD-10 codes I60-I69
Atherosclerosis	Not used in this report	ICD-10 code I70
Congestive heart failure	Not used in this report	ICD-10 code I50
Hypertensive disease	Not used in this report	ICD-10 codes I10, I11, I12, I13
Cardiac disease deaths by location (Reference 1)	Not used in this report	ICD-10 codes I00-I09, I11, I13, I20-I51, Q20-Q24
Other Cardiovascular disease[3]	Not used in this report	Selected codes between ICD-10 codes I00-I99

Additional codes used in this report include:

Disease category	ICD-10 (used 1999 to present)
Malignant neoplasms	ICD-10 codes C00-C97
Chronic lower respiratory diseases	ICD-10 codes J40-J47
Unintentional injury-accident	ICD-10 codes V01-X59, Y85-Y86

[3] Other cardiovascular disease (CVD) deaths exclude coronary (or ischemic) heart disease, stroke, atherosclerosis, congestive heart failure, and hypertensive disease

Alzheimer's disease	ICD-10 code G30
Diabetes mellitus	ICD-10 codes E10-E14
Influenza and pneumonia	ICD-10 codes J10-J18
Intentional self-harm-suicide	ICD 10 codes X60-X84, Y87.0
Chronic liver disease and cirrhosis	ICD-10 codes K70, K73-K74

b. Trend analyses

To test for trends in cardiovascular disease groupings join point testing was done using the National Cancer Institute Join Point Regression Program. This testing "enables the user to test that an apparent change in trend is statistically significant. The tests of significance use a Monte Carlo Permutation method. The models may incorporate estimated variation for each point (e.g. when the responses are age adjusted rates) or use a Poisson model of variation. In addition, the models may also be linear on the log of the response (e.g. for calculating annual percentage rate change)." (Reference 2)

c. Key elements analyzed:

The following information about cardiovascular disease and related mortality was analyzed: leading causes of death, leading cause of cardiovascular deaths, CVD disease grouping trends comparing mortality over time for Washington State, the United States, and Healthy People 2010 objectives, CVD mortality sex trends, CVD mortality age grouping and trends, CVD mortality age and sex grouping, CVD mortality by race and ethnicity, and cardiac deaths by location at death. Geographic variation and trends in Washington State were also assessed using county level CVD mortality data and mapping software.

d. Percentage estimates:

Percentage estimates may not add to 100% due to rounding.

e. Designation of race and ethnicity:

- Death certificates use open-ended reporting of race, allowing for multiple racial entries. However, the multiple race data have not been used in this report because they are of uncertain quality and completeness. The determination of race when more than one race is reported follows decision rules established by the National Center for Health Statistics (NCHS). In most cases, the first race given is assigned as the person's race.
- Hispanic origin was added as an ethnic category in the vital records system and collected as a separate item (in addition to race) in 1988. Prior to 1988, Hispanic data were provided by a racial category of "Mexican/Chicano" or "Mexican American."
- Following national guidelines, people who report Hispanic ethnicity and other or Hispanic as a race are counted as white. In 2000, 589 or 1.4% of all white deaths had race classified using this guideline.
- In a few instances, Hispanic ethnicity is marked unknown, and Hispanic is given as the person's race. Beginning in 1992, if a person's ethnicity is marked as unknown and his/her race is given as Hispanic, then that person's ethnicity is counted as Hispanic. About 60 deaths each year are reclassified in this way. However, the increase results in a 14% increase in the number of Hispanics at death.

- Reporting of race/Hispanic origin on death certificates is sometimes based on observing the decedent rather than questioning the next of kin. This procedure causes an underestimate of deaths for certain groups, particularly Native Americans, some of the Asian subgroups, and Hispanics. Death rates based on death certificate data are lower than true death rates for certain racial/ethnic groups. See caveat below for more information.

f. Additional caveats:

- Unless otherwise noted, the mortality rates in *The Burden of Heart Disease and Stroke in Washington State, 2004* use the underlying cause of death. For example, if a person dies of pneumonia as a complication of a stroke, the underlying cause of death is reported as a stroke.
- The number of deaths in certain racial subgroups (such as Asians and Native Americans) and for people of Hispanic origin might be underestimated because of the misclassification of deaths for some people in those groups to white, non-Hispanic. See *Quality of Death Rates by Race and Hispanic Origin: A Summary of Current Research, 1999* (http://www.cdc.gov/nchs/products/pubs/pubd/series/sr02/130-121/sr2_128.htm).
- Death rates can underestimate the magnitude of certain public health problems for deaths that might be under-reported due to social stigma (such as AIDS and suicide).
- Differences in causes of death between counties could reflect cause of death reporting practices by local physicians, coroners, or medical examiners.
- Revisions in ICD codes create a discontinuity in trends that must be accounted for when comparing mortality rates between time periods using different revisions. In this document, mortality rates from 1980 – 1998 are coded following the ICD-9. Mortality rates for 1999 and 2002 are coded following the ICD-10. Ratios of the number of deaths recoded using ICD-10 to the number originally coded using ICD-9 (obtained from a study of a large sample of 1996 US deaths) can assist when trying to determine whether a trend noted in the 1980 – 1998 period has continued in 1999 and 2000. The ratios are called comparability ratios. For the purposes of this report comparability ratios were applied to mortality trend data prior to 1999. For more information, see *Washington State Department of Health Center for Health Statistics ICD-10 Information Page* (http://www.doh.wa.gov/ehsphl/chs/chs-data/death/dea_icd.htm) or *Comparability of Cause of Death Between ICD-9 and ICD-10: Preliminary Estimates* (http://www.cdc.gov/nchs/data/nvsr/nvsr49/nvsr49_02.pdf).

4. National Data

National death data are available from several sources within the federal government. For this report, national data was obtained using the Centers for Disease Control and Prevention CDC Wonder On-line Database. See CDC Wonder data source documentation for more information.

For comparison of trends in statewide cardiovascular disease mortality to that of the U.S., comparability ratios were applied to rates prior to 1999; see additional caveats under the Death Certificate System data source documentation.

a. Number of Deaths: Information about the following cardiovascular disease related deaths are presented throughout the report for the United States: major cardiovascular disease (ICD-9 codes 390-434, 436-448: ICD-10 codes I00-I78), coronary (or ischemic) heart disease (ICD-9 codes

410-414, 429.2: ICD-10 codes I20-I25), and stroke (ICD-9 codes 430-434, 436-438: ICD-10 codes I60-I69).

b. Key elements analyzed:
The following information about cardiovascular disease and related mortality was analyzed using the CDC Wonder database: CVD disease grouping trends comparing mortality over time for Washington State, the United States, and Healthy People 2010 objectives. United States Mortality was also compared to Washington State county level data.

c. Additional caveats:
- Caveats from the Death Certificate System data source apply to CDC Wonder database
- Please refer to the following CDC Wonder website for additional caveats: http://wonder.cdc.gov/wonder/help/mort.html

For further information, please see:

Washington State Department of Health, Center for Health Statistics, (360) 236-4324.
Washington State Department of Health, Center for Health Statistics, Death Page.
(http://www.doh.wa.gov/EHSPHL/CHS/CHS-Data/death/deatmain.htm)

United States Department of Health and Human Services (US DHHS),
Centers for Disease Control and Prevention (CDC),
National Center for Health Statistics (NCHS),
Office of Analysis and Epidemiology (OAE),
Compressed Mortality File (CMF)[4] compiled from
CMF 1968-1988, Series 20, No. 2A 2000,
CMF 1989-1998, Series 20, No. 2E 2003 and
CMF 1999-2001, Series 20, No. 2G 2004
on CDC WONDER On-line Database.

5. Census and Intercensal Interpolations*:*

Population data in this report are from the US decennial census for 1980, 1990, and 2000. Population data for 1981 – 1989 and 1991 – 2002 are called intercensal interpolations. These are provided by the Washington State Office of Financial Management (OFM) Forecasting Division.

a. Description of the System
Purpose: The United States Constitution mandates a count of people living in the United States every 10 years to determine how many seats each state will have in the US House of Representatives. The US census is also used for political redistricting, distribution of federal and state funds, and other governmental needs. The primary purpose of intercensal interpolations is

[4] "The Compressed Mortality File (CMF) is a county-level national mortality and population data base spanning the years 1968-2001. On CDC WONDER, data are available for the years 1979-2001. The number of deaths, crude death rates or age-adjusted death rates can be obtained by place of residence (total U.S., state, and county), age group, race (white, black, and other), sex, year of death, and underlying cause-of-death (4-digit ICD code or group of codes) (Reference 3)."

to provide a count of people in Washington between the decennial censuses. Both the US census counts and the Washington intercensal estimates are also used by many other entities for a diversity of purposes, such as the denominator for calculating rates of health events.

Coverage: The US census attempts to count everyone living in Washington on April 1st of the census year. In March 2001, the US Census Monitoring Board reported that approximately 98.5% of people living in Washington in April 2000 were counted in the 2000 census. Nationally, the Board estimated that 98.8% were counted. For discussions of accuracy and undercounts, see http://www.cmbp.gov/ or http://www.cmbc.gov/.

Years: US census: 1980, 1990, 2000; intercensal interpolations: 1981 – 1989, 1991 – 2002.

Key Data Elements: US census: age, sex, race; intercensal interpolations: age, sex

Reporting System: *US Census*: The Bureau of the Census located in the Department of Commerce, develops and mails census questionnaires to all known addresses where people might live including housing units and other places, such as hospitals and hotels, the United States, Puerto Rico and other US territories. Information is gathered by a *short form questionnaire* sent to five out of six housing units and a *long form questionnaire* sent to the remaining addresses. The short form asks basic questions, such as name, age, sex, and race of everyone in the household. The *long form* includes the questions on the short form, additional demographic questions, such as income and education, and questions about housing. Census takers visit housing units in rural and remote areas to drop off and pick up forms and visit housing units that do not return census forms. Census workers also stage a one-day operation to obtain information on homeless persons and others who might be missed in the traditional enumeration of housing units and group quarters.

Intercensal interpolations: OFM develops the intercensal interpolations using information from the decennial censuses, annual data on the number of births and deaths in Washington, and a variety of other data, such as housing starts, to estimate migration into and out of Washington. More information on how these estimates are developed is available at www.ofm.wa.gov/pop/annex/process/overview.pdf.

Data Quality Procedures: US census data are subject to quality procedures employed by the US Census Bureau prior to release. These procedures evaluate the completeness of the count, try to remove individuals who have been counted more than once and make other adjustments required for an accurate count. More information on data quality can be found at http://www.census.gov/pred/www/eval_top_rpts.htm#COLLECTION. Information on data quality procedures used in developing the intercensal estimates is available at www.ofm.wa.gov/pop/annex/dataqualproc.pdf.

b. Race and Ethnicity

The 2000 census first asked people to categorize themselves based on both race and ethnicity. People were asked whether they identified themselves as Hispanic or Latino/a.
They were then asked to identify themselves as belonging to one or more racial groups as follows: “White; Black, African American or Negro; American Indian or Alaska Native;” and 11

other groups that the census generally classifies as Asians or Native Hawaiians and other Pacific Islanders in their reports.

Between 1980 and 1990, people were asked to choose only one racial group that they belonged to. Somewhat different terminology was used to describe racial groups (for example, Asians and Pacific Islanders were combined as one group, and people were asked about their race first and then about whether they were Hispanic.

Intercensal interpolations for 1991 – 2002 from OFM do not include race and ethnicity. Because population counts by race/ethnicity were only available for 2000 at the time this report was produced, the numerator for CVD death rates by race and ethnicity use a three year average count of death, while the denominator is the 2000 population count.

c. Caveats

- Although the Census Bureau attempts to obtain information from every known household, homeless persons, undocumented persons who deliberately avoided the census for fear of disclosure to the Immigration and Naturalization Services, urban poor living over commercial addresses, and others are undercounted by the census. The undercount is larger for some groups than for others. For example, an April 4, 2002 memorandum from the Census Bureau (DSSD Revised A.C.E. Estimates Memorandum Series PP-2) estimates that Native Hawaiians and Other Pacific Islanders are undercounted by almost 5% and American Indians by approximately 3%. The undercount might also affect some geopolitical jurisdictions more than others. In general, the smaller the group, the greater the potential for the undercount to be relatively large. (There is also a small group of people who were counted more than once resulting in an overcount. We do not have information on overcounts in Washington, but the national estimates are relatively small, i.e. less than one half of one percent for Whites and Asians.)
- The 2000 census only allowed reporting of up to six people per household and so large households may not have included everyone.
- College students are usually enumerated in the towns in which they attend college, although their health events might be reported at their parents or guardians. This has implications for several counties in Washington.
- People who are confined in institutional group quarters, such as mental hospitals and prisons, are reported separately and these numbers are not included in the population counts used in this document. This may affect rates of health events among some age and race groups with disproportionately high rates of incarceration.
- Due to reporting rules for active military personnel, some Washington jurisdictions might have military personnel who do not actually reside in those jurisdictions counted as part of the population. This phenomenon might affect rates of some conditions in counties with a high proportion of people who are active military.

For further information

US Bureau of Census Website: http://www.census.gov.
Washington State Office of Financial Management (OFM) http://www.ofm.wa.gov.

6. Healthy People 2010

Healthy People 2010 is a report that provide national health promotion and disease prevention objectives. These objectives were developed under the aegis of the United States Department of Health and Human Services incorporating input from federal, state, and local agencies and extensive public comment. This report covers topics that correspond to objectives in *Healthy People 2010*. Where possible, we have provided information to assess progress in reaching the goal for 2010.

The reader must be careful when assessing Washington rates relative to the national goals. Many of the Washington indicators are not identical to the indicators used in the national goals. Some of our indicators differ from the national indicators because due to lack of comparable data. In this report, when comparisons are made between *Healthy People* indicators and Washington data, we used the Washington definition even though the definition might differ from that of the Healthy People 2010 definition. *Healthy People 2010* are age-adjusted to the 2000 US standard population.

The goal and objectives specific to heart disease and stroke are included here as a reference.

Goal: Improve cardiovascular health and quality of life through the prevention, detection, and treatment of risk factors; early identification and treatment of heart attacks and strokes; and prevention of recurrent cardiovascular events.

Objectives:
12-1. Reduce coronary heart disease deaths.
12-2. (Developmental) Increase the proportion of adults aged 20 years and older who are aware of the early warning symptoms and signs of a heart attack and the importance of accessing rapid emergency care by calling 9-1-1.
12-3. (Developmental) Increase the proportion of eligible patients with heart attack who receive artery-opening therapy within an hour of symptom onset.
12-4. (Developmental) Increase the proportion of adults aged 20 years and older who call 9-1-1 and administer cardiopulmonary resuscitation (CPR) when they witness an out-of-hospital cardiac arrest.
12-5. (Developmental) Increase the proportion of eligible persons with witnessed out-of-hospital cardiac arrest who receive their first therapeutic electrical shock within 6 minutes after collapse recognition.
12-6. Reduce hospitalizations of older adults with congestive heart failure as the principal diagnosis.
12-7. Reduce stroke deaths.
12-8. (Developmental) Increase the proportion of adults who are aware of the early warning symptoms and signs of a stroke.
12-9. Reduce the proportion of adults with high blood pressure.
12-10. Increase the proportion of adults with high blood pressure whose blood pressure is under control.
12-11. Increase the proportion of adults with high blood pressure who are taking action (for example, losing weight, increasing physical activity, or reducing sodium intake) to help control their blood pressure.

12-12. Increase the proportion of adults who have had their blood pressure measured within the preceding 2 years and can state whether their blood pressure was normal or high.
12-13. Reduce the mean total blood cholesterol levels among adults.
12-14. Reduce the proportion of adults with high total blood cholesterol levels.
12-15. Increase the proportion of adults who have had their blood cholesterol checked within the preceding 5 years.
12-16. (Developmental) Increase the proportion of persons with coronary heart disease who have their LDL-cholesterol level treated to a goal of less than or equal to 100 mg/dL.

Additional information on *Healthy People 2000* and *Healthy People 2010* is available at http://odphp.osophs.dhhs.gov/pubs/hp2000/ and http://www.health.gov/healthypeople/default.htm

DATA ANALYSIS

1. 95% Confidence Intervals for Rates:

Confidence intervals are calculated to facilitate comparisons over time, between geographic locations (e.g., county versus state), and between subpopulations grouped by certain demographic characteristics. Narrow confidence intervals for rates indicate with greater certainty that the calculated rate is a precise approximation of the true rate, while wide confidence intervals represent greater variability and less certainty that the calculated rate is a precise estimate of the true rate.

When comparing two percentages, if the 95% CI of two percentages overlap, and include either point estimate, the differences between the two percentages is NOT statistically significant. If the confidence intervals overlap with each other, but not with the point estimates, the two percentages may or may not be significantly different; further statistical tests are needed to determine significance, such as p values derived from Pearson chi-square statistics. If the confidence intervals do not overlap, the percentages are significantly different. Confidence intervals and standard errors for crude and age-adjusted mortality rates were generated using STATA software and follow the *Guidelines for Using Confidence Intervals for Public Health Assessment* (Reference 4*)* as appropriate.

2. Crude Rates:

This is the number of people or events (number who engage in certain behaviors; hospital discharges or deaths) per population unit (statewide or total county population). It is an unadjusted summary measure that may be used to describe the overall burden of risk behaviors and conditions, hospitalizations, or deaths related to CVD in the total population, irrespective of age. It is calculated by dividing the total number of people or events (behaviors, condition or select diagnoses) in a single year by the total number of individuals statewide or countywide and multiplying by 1,000 (in the case of hospitalizations) or by 100,000 (in the case of risk factors, conditions and deaths). When there are less than five events per population unit, the rate is suppressed due to imprecision of the calculated rate. For small numbers, year-to-year fluctuations may not reflect a true change in the underlying prevalence or frequency of

occurrence (Reference 5). To obtain adequate numbers to produce more precise county rates, three years of data were combined.

3. Age-adjusted Rates:

Age adjustment of rates removes differences in the age composition of two or more populations to allow comparisons between these populations independent of their age structure. Age-adjusted rates should be used when comparing the state to the U.S. as a whole, when comparing county rates to the state rate, or when comparing rates for males to rates for females. All age-adjusted rates in the burden report are computed by applying age-specific rates to the 2000 U.S. standard population using the following age groupings for deaths and hospitalizations: <1, 1-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85+ years. For BRFSS survey results, the following age groupings recommended by the Council of State and Territorial Epidemiologists were used: 18-24, 25-34, 35-44, 45-64, 65+ years. Since, age-adjusted rates are relative indices (and not actual measures of burden) they should not be compared to crude rates.

4. Geographic Variation

The maps in this report compare county rates or frequencies to the Washington State and the United States average. County death and hospitalization rates were ranked from highest to lowest and then classified based on the quantile method with 4 classes for hospitalization and mortality rate maps. For maps that show a percent change in mortality rates classification was based on a natural break (Jenks) method with 5 classes. The shading of the counties go from light for those counties that have the lowest rates to dark for those counties that have higher rates based on the quantile method. For the percent change in rate maps, the lighter shading represents those counties that had the largest decrease in their rate from 1996-1998 to 2000-2002 based on the natural break method. The darker shading in the percent change in rate maps represents those counties that had the smallest decrease or even an increase in their rate for the same time period based on the natural break method. Washington State and United States statistics have been provided for comparison. The United States percent change in rate is based on the midpoint year 1997 versus 2001 due to the unavailability of 2002 United States data at the time this report was produced.

Additional caveats:

The rate for the state as a whole is strongly influenced by rates in the most populous counties (that is, King, Pierce, and Snohomish). If highly populated counties have rates that are higher than other counties, the distribution of county rates may be skewed such that there are many counties below the state rate, and few above the state rate or vice versa.

Maps are presented to provide an indication of the ranking of counties in relation to one another and to the state as a whole. In many instances the difference between two counties that are in different rate categories is not statistically significant. Data tables corresponding to each map, which list rates and their 95% confidence intervals, are included in the Data Appendix so that readers may better assess differences between county rates.

Counties whose rates were based on fewer than five events (Reference 6) were noted as unreliable rates; the rates and frequencies for these counties were suppressed.

County-level hospitalization data for counties in which a large proportion of the population uses military hospitals or hospitals in neighboring states may underreport the true hospitalization rate. Thus, caution should be used when interpreting county rates for Island County because of the large proportion of people using military hospitals and for Asotin, Garfield, and Clark, Cowlitz, Klickitat, Pacific, Skamania, and Wahkiakum counties because of the large proportion using hospitals in Idaho or Oregon. Information on Washington residents hospitalized in neighboring states was not included in this report. (See ***Comprehensive Hospital Abstract Reporting Systems (CHARS)*** data source documentation for additional detail.)

References

1) Centers for Disease Control and Prevention: MMWR article: State-Specific Mortality from Sudden Cardiac Death --- United States, 1999 *Vol 51, No 06;123-6 02/15/2002* Available from http://www.cdc.gov/mmwr/PDF/wk/mm5106.pdf

2) For additional information on Join Point, see The National Cancer Institute website: http://srab.cancer.gov/joinpoint/

3) For additional information on CDC Wonder, see database website: http://wonder.cdc.gov/wonder/help/mort.html

4) For additional information, see The Washington State Department of Health website *Guidelines for Using Confidence Intervals for Public Health Assessment* (http://www.doh.wa.gov/Data/guidelines/ConfIntguide.htm

5) Additional information about BRFSS was obtained from The Washington State Department of Health website at http://www.doh.wa.gov/EHSPHL/CHS/CHS-Data/brfss/brfss_homepage.htm.

6) For additional information, see The Washington State Department of Health website *Guidelines for Working with Small Numbers* (http://www.doh.wa.gov/Data/Guidelines/SmallNumbers.htm)

7) Most of this information in this technical report was obtained from the following: Washington State Department of Health. Health of Washington State. Olympia, WA, 2002 Aug [cited 2004 July 3] 418p. Available from http://www.doh.wa.gov/HWS

Data Appendix

List of Data Appendix Tables

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Table 1. Trends in the Prevalence of Cardiovascular Disease Related Risk Factors Among Adults[1] in the State of Washington.

	Obesity[2]		Diabetes[3]		Smoking[4]		Hypertension[5]		High Cholesterol[6]		Insufficient leisure time physical activity[7,8]		Eat fruits & vegetables < 5 times a day	
Year	Crude %[9]	Age-standardized[10] % 95% CI[11]	Crude %[9]	Age-standardized[10] % 95% CI[11]	Crude %[9]	Age-standardized[10] % 95% CI[11]	Crude %[9]	Age-standardized[10] % 95% CI[11]	Crude %[9]	Age-standardized[10] % 95% CI[11]	Crude %[9]	Age-standardized[10] % 95% CI[11]	Crude %[9]	Age-standardized[10] % 95% CI[11]
1990	9.4	10.2 [8.7, 11.7]	not calculated		23.1	22.6 [20.7, 24.6]	22.7	24.4 [22.4, 26.3]	28.9	27.3 [24.7, 29.9]	not calculated		--	--
1991	10.5	11.0 [9.3, 12.6]	not calculated		24.2	24.0 [21.9, 26.2]	19.0	20.4 [18.4, 22.4]	26.5	26.1 [23.4, 28.8]	not calculated		--	--
1992	12.1	12.7 [11.2, 14.1]	not calculated		21.9	21.5 [19.8, 23.2]	19.3	20.4 [18.8, 22.1]	25.8	25.2 [23.0, 27.4]	not calculated		--	--
1993	13.9	14.3 [12.8, 15.8]	3.6	4.0 [3.1, 4.8]	22.5	22.2 [20.4, 24.0]	22.0	23.1 [21.4, 24.8]	29.2	28.3 [26.0, 30.6]	--	--	--	--
1994	13.9	14.3 [13.0, 15.6]	3.8	4.1 [3.3, 4.8]	21.9	21.6 [20.1, 23.1]	--	--	--	--	not calculated		78.6	78.3 [76.8, 79.8]
1995	13.9	14.0 [12.7, 15.4]	3.1	3.2 [2.6, 3.9]	20.2	20.3 [18.8, 21.8]	20.9	21.5 [20.0, 23.0]	29.1	27.5 [25.6, 29.3]	--	--	--	--
1996	15.6	15.6 [14.2, 17.0]	3.4	3.5 [2.8, 4.1]	23.4	23.4 [21.9, 25.0]	--	--	--	--	73.7	73.4 [71.8, 75.1]	77.1	77.0 [75.4, 78.6]
1997	15.2	15.3 [13.9, 16.7]	4.1	4.2 [3.5, 4.9]	23.8	23.8 [22.0, 25.6]	23.2	23.4 [21.8, 24.9]	25.6	23.1 [21.5, 24.7]	--	--	--	--
1998	18.1	18.1 [16.5, 19.7]	4.9	5.0 [4.1, 5.8]	21.4	21.4 [19.8, 22.9]	--	--	--	--	74.5	74.5 [72.8, 76.2]	74.2	74.1 [72.4, 75.8]
1999	18.2	18.2 [16.8, 19.7]	5.2	5.2 [4.4, 6.0]	22.4	22.4 [20.7, 24.1]	22.1	22.1 [20.5, 23.6]	28.3	25.5 [23.7, 27.3]	--	--	--	--
2000	18.8	18.7 [17.3, 20.2]	5.5	5.5 [4.7, 6.3]	20.7	20.7 [19.2, 22.2]	--	--	--	--	73.0	72.9 [71.2, 74.5]	75.3	75.3 [73.7, 76.8]
2001	19.3	19.2 [17.9, 20.5]	5.7	5.7 [5.0, 6.4]	22.5	22.6 [21.1, 24.0]	24.4	24.3 [22.9, 25.7]	29.2	26.2 [24.6, 27.8]	44.5	44.6 [42.9, 46.4]	--	--
2002	21.3	21.1 [19.6, 22.6]	5.8	5.9 [5.1, 6.7]	21.5	21.2 [19.7, 22.7]	--	--	--	--	--	--	76.2	76.0 [74.6, 77.5]

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Defined as body mass index ≥30.0 kg/m^2, as calculated from self-reported heights and weights.

[3]Prior to 1993, the BRFSS measure of diabetes included women with gestational diabetes and is therefore not comparable to later years.

[4]Currently smoke cigarettes.

[5]In 1993, 1995, 1997, 1999 those who reported never having blood pressure checked were not asked if a doctor had told them that they had high blood pressure (excluded from denominator).

[6]Questions asked only of respondents who had ever had their blood cholesterol checked.

[7]For 1996-2001, includes adults who were not active during leisure time on 5 or more days per week for at least 30 minutes each day. Data prior to 1996 were not calculated, as the definitions used for leisure time physical activity during that period were different, and therefore not comparable, to later versions of this question.

[8]From 2001 on, includes adults who did not meet current physical activity recommendations--5 or more days per week of moderate physical activity for at least 30 minutes each day, or 3 or more days per week of vigorous physical activity for at least 20 minutes each day (changes made to physical activity questions in 2001 BRFSS do not allow for comparisons with previous years data).

[9]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[10]Age-standardized to US 2000 standard population using the following age groups: 18-24, 25-34, 35-44, 45-64, 65+ years.

[11]95% Confidence Interval around the age-standardized estimate.

--No data available this year.

Notes:

When 95% Confidence Intervals of two percentages overlap, and include either point estimate, the two percentages are NOT statistically significantly different. When 95% CI's overlap, but do not include either point estimate, the two percentages may or may not be significantly different and further statistical tests are needed to determine significance, such as Pearson's Chi-Square test. If the 95% CI's do not overlap, the percentages are significantly different.

Table 2. Prevalence of Select Risk Factors Among Adults[1] by Sex, Washington.

	Males			Females			X^2
Risk Factor	**n/N**	**%[2]**	**95% CI[3]**	**n/N**	**%[2]**	**95% CI[3]**	p-value
Smoking[4] (2000-2002)	1193/5195	23.3	[22.0, 24.7]	1461/7430	19.9	[18.8, 21.0]	0.0001
Diabetes (2000-2002)	329/5207	6.0	[5.3, 6.8]	423/7460	5.4	[4.8, 6.0]	0.1826
Obesity[5] (2000-2002)	1067/5149	20.7	[19.4, 22.0]	1385/6961	19.0	[17.9, 20.0]	0.0399
Insufficient Leisure Time Physical Activity[6] (2001)	747/1673	45.3	[42.7, 48.0]	1025/2280	43.7	[41.5, 46.0]	0.3648
High Blood Pressure (1997, 1999, 2001)	1114/4881	22.7	[21.3, 24.0]	1533/6487	23.8	[22.6, 25.1]	0.2032
High Cholesterol (1997, 1999, 2001)	1026/3511	28.1	[26.5, 29.8]	1404/5062	27.4	[26.1, 28.8]	0.5228
Eat fruits & vegetables < 5 times a day (1998, 20000, 20002)	4086/5045	81.5	[80.3, 82.7]	4860/7024	69.2	[68.0, 70.5]	0.0000

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[3]95% Confidence Interval.

[4]Currently smoke cigarettes.

[5]Defined as body mass index ≥30.0 kg/m^2, as calculated from self-reported heights and weights.

[6]Did not meet current physical activity (PA) recommendations of 5 or more days per week of moderate physical activity for at least 30 minutes each day, or 3 or more days per week of vigorous physical activity for at least 20 minutes each day.

Table 3. Prevalence of Select Risk Factors Among Adults[1] by Age, Washington.

	18-34 years			35-49 years			50-64 years			65 years or more		
Risk Factor	**n/N**	**%[2]**	**95% CI[3]**	**n/N**	**%[2]**	**95% CI[3]**	**n/N**	**%[2]**	**95% CI[3]**	**n/N**	**%[2]**	**95% CI[3]**
Smoking[4] (2000-2002)	868/3401	26.5	[24.7, 28.3]	1001/4156	24.1	[22.6, 25.6]	543/2835	19.2	[17.5, 21.0]	237/2189	10.2	[8.9, 11.7]
Diabetes (2000-2002)	42/3407	1.1	[0.7, 1.5]	146/4165	3.7	[3.1, 4.5]	266/2841	9.6	[8.4, 10.9]	297/2210	13.4	[11.9, 15.1]
Obesity[5] (2000-2002)	539/3289	15.7	[14.3, 17.3]	804/3972	20.7	[19.2, 22.2]	727/2692	26.2	[24.3, 28.1]	376/2124	17.8	[16.0, 19.7]
Insufficient Leisure Time Physical Activity[6] (2001)	437/1110	38.3	[34.9, 41.7]	601/1374	44.5	[41.6, 47.4]	394/814	47.9	[44.1, 51.7]	332/627	53.1	[48.9, 57.3]
High Blood Pressure (1997, 1999, 2001)	294/3260	9.1	[7.9, 10.6]	644/3918	16.6	[15.4, 18.0]	754/2241	34.1	[31.8, 36.4]	942/1902	49.5	[47.0, 51.9]
High Cholesterol (1997, 1999, 2001)	214/1650	12.0	[10.4, 13.7]	746/3135	23.3	[21.7, 25.0]	749/2057	35.4	[33.2, 37.8]	710/1688	41.9	[39.4, 44.5]
Eat fruits & vegetables < 5 times a day (1998, 20000, 20002)	2534/3233	79.1	[77.4, 80.8]	3075/4045	77.4	[76.0, 78.8]	1959/2711	73.0	[71.0, 74.9]	1368/2068	66.3	[63.9, 68.6]

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[3]95% Confidence Interval.

[4]Currently smoke cigarettes.

[5]Defined as body mass index ≥30.0 kg/m^2, as calculated from self-reported heights and weights.

[6]Did not meet current physical activity (PA) recommendations of 5 or more days per week of moderate physical activity for at least 30 minutes each day, or 3 or more days per week of vigorous physical activity for at least 20 minutes each day.

Notes:

When 95% Confidence Intervals of two percentages overlap, and include either point estimate, the two percentages are NOT statistically significantly different. When 95% CI's overlap, but do not include either point estimate, the two percentages may or may not be significantly different and further statistical tests are needed to determine significance, such as Pearson's Chi-Square test. If the 95% CI's do not overlap, the percentages are significantly different.

Table 4. Trends in the Prevalence of Cardiovascular Disease Among Adults[1] in the State of Washington.

	Cardiovascular Disease[2]			Infarction[3]			Angina/ Coronary Heart Disease[3]			Stroke[3]		
		Age-standardized[5]			Age-standardized[5]			Age-standardized[5]			Age-standardized[5]	
Year	Crude %[4]	%	95% CI[6]	Crude %[4]	%	95% CI[6]	Crude %[4]	%	95% CI[6]	Crude %[4]	%	95% CI[6]
1996	7.2	7.5	[6.6, 8.4]	3.8	3.9	[3.2, 4.6]	4.2	4.4	[3.7, 5.1]	1.6	1.7	[1.2, 2.1]
1997	--		--	--		--	--		--	--		--
1998	6.9	7.0	[6.0, 8.0]	3.7	3.7	[3.0, 4.5]	4.2	4.3	[3.4, 5.1]	1.6	1.6	[1.1, 2.0]
1999	--		--	--		--	--		--	--		--
2000	--		--	--		--	--		--	--		--
2001	7.3	7.3	[6.5, 8.2]	3.5	3.5	[2.9, 4.1]	3.9	4.0	[3.3, 4.6]	2.2	2.3	[1.8, 2.7]
2002	--		--	--		--	--		--	--		--

Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1996 through 2002.

[1]Age 18 years or older.

[2]Includes heart attack or myocardial infarction, angina or coronary heart disease, and stroke. Percentages of heart attack, angina, and stroke do not add up to total of cardiovascular disease because one person may report more than one condition.

[3]In 2001 questions added ever told by nurse or health care professional, in 1996 and 1998 only specified if doctor told.

[4]Weighted percent.

[5]Age-standardized to US 2000 standard population using the following age groups: 18-24, 25-34, 35-44, 45-64, 65+ years.

[6]95% Confidence Interval around the age-standardized estimate.

Table 5. Prevalence of Select Risk Factors Among Adults[1] by Race and Ethnicity, Washington.

	White			Black or African American			Asian, Native Hawaiian, or			American Indian or Alaskan			Hispanic or Latino, Any race		
Risk Factor	n/N	%[2]	95% CI[3]	n/N	%[2]	95% CI[3]	n/N	%[2]	95% CI[3]	n/N	%[2]	95% CI[3]	n/N	%[2]	95% CI[3]
Smoking[4] (2000-2002)	2346/11345	21.2	[20.3, 22.1]	70/311	23.7	[18.5, 29.8]	91/493	17.8	[14.2, 22.0]	74/227	35.8	[28.2, 44.1]	120/514	24.3	[20.1, 29.1]
Diabetes (2000-2002)	656/11380	5.5	[5.0, 6.0]	27/312	6.8	[4.4, 10.3]	24/494	4.9	[3.2, 7.6]	19/227	7.8	[4.8, 12.4]	30/516	5.5	[3.7, 8.0]
Obesity[5] (2000-2002)	2198/10897	19.7	[18.9, 20.6]	88/298	30.4	[24.1, 37.5]	51/468	11.7	[8.6, 15.8]	65/214	27.0	[20.7, 34.3]	116/499	21.1	[17.4, 25.3]
Insufficient Leisure Time Physical Activity[6] (2001)	1580/3577	43.9	[42.1, 45.8]	46/94	48.2	[37.3, 59.3]	90/157	56.8	[47.9, 65.2]	33/67	48.6	[35.6, 61.9]	63/143	47.0	[37.8, 56.4]
High Blood Pressure (1997, 1999, 2001)	2426/10287	23.5	[22.6, 24.5]	67/244	24.7	[18.7, 31.8]	52/404	15.3	[10.8, 21.1]	47/185	28.9	[20.6, 38.9]	96/478	21.4	[16.8, 26.8]
High Cholesterol (1997, 1999, 2001)	2245/7846	28.0	[26.9. 29.2]	47/164	26.0	[18.8, 34.7]	61/262	24.2	[18.8, 30.6]	30/115	26.5	[18.2, 36.8]	81/295	27.0	[21.6, 33.3]
Eat fruits & vegetables < 5 times a day (1998, 20000, 20002)	8034/10847	75.3	[74.3, 76.2]	219/292	76.0	[69.8, 81.3]	335/444	74.5	[69.4, 79.1]	153/203	77.5	[70.2, 83.5]	400/515	79.9	[75.7, 83.4]

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[3]95% Confidence Interval.

[4]Currently smoke cigarettes.

[5]Defined as body mass index ≥30.0 kg/m², as calculated from self-reported heights and weights.

[6]Did not meet current physical activity (PA) recommendations of 5 or more days per week of moderate physical activity for at least 30 minutes each day, or 3 or more days per week of vigorous physical activity for at least 20 minutes each day.

Notes:

When 95% Confidence Intervals of two percentages overlap, and include either point estimate, the two percentages are NOT statistically significantly different. When 95% CI's overlap, but do not include either point estimate, the two percentages may or may not be significantly different and further statistical tests are needed to determine significance, such as Pearson's Chi-Square test. If the 95% CI's do not overlap, the percentages are significantly different.

Caution about small sample sizes: Numerators <10 and denominators <50 should be suppressed and show as (IS) to indicate insufficient sample. Use caution in interpreting numerator sizes between 10 and 30.

Table 6. Cardiovascular Disease, Heart Disease, and Stroke Among Adults[1] by Sex, Washington, 2001.

	With Cardiovascular Disease[2]			With Heart Disease[3]			With Stroke[4]		
Sex	**n/N**	**%**	**[95% CI]**	**n/N**	**%**	**[95% CI]**	**n/N**	**%**	**[95% CI]**
Male	145/300	56.6	[50.5, 62.5]	126/236	60.6	[53.9, 67.0]	37/95	48.7	[38.0, 59.6]
Female	155/300	43.4	[37.5, 49.5]	110/236	39.4	[33.0, 46.1]	58/95	51.3	[40.5, 62.0]

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Told by doctor, nurse, or other health professional that they had a heart attack, angina, coronary heart disease, or a stroke.

[3]Told by doctor, nurse, or other health professional that they had a heart attack, angina, or coronary heart disease.

[4]Told by doctor, nurse, or other health professional that they had a stroke.

[5]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[6]95% Confidence Interval.

Table 7. Age Distribution of Adults[1] With Cardiovascular Disease, Heart Disease, and Stroke, Washington, 2001.

	With Cardiovascular Disease[2]			With Heart Disease[3]			With Stroke[4]		
Age	**n/N**	**%[5]**	**95% CI[6]**	**n/N**	**%[5]**	**95% CI[6]**	**n/N**	**%[5]**	**95% CI[6]**
18-34	10/298	3.2	[1.6, 6.1]	10/235	4.0	[2.0, 7.6]	IS	IS	IS
35-49	43/298	12.9	[9.4, 17.5]	33/235	12.8	[8.9, 18.1]	11/94	9.0	[4.7, 16.4]
50-64	78/298	27.7	[22.4, 33.6]	66/235	28.0	[22.2, 34.6]	17/94	21.7	[13.7, 32.7]
65+	167/298	56.2	[50.0, 62.2]	126/235	55.3	[48.3, 62.0]	65/94	67.4	[56.3, 76.9]

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Told by doctor, nurse, or other health professional that they had a heart attack, angina, coronary heart disease, or a stroke.

[3]Told by doctor, nurse, or other health professional that they had a heart attack, angina, coronary heart disease.

[4]Told by doctor, nurse, or other health professional that they had a stroke.

[5]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[6]95% Confidence Interval.

Notes:

When 95% Confidence Intervals of two percentages overlap, and include either point estimate, the two percentages are NOT statistically significantly different. When 95% CI's overlap, but do not include either point estimate, the two percentages may or may not be significantly different and further statistical tests are needed to determine significance, such as Pearson's Chi-Square test. If the 95% CI's do not overlap, the percentages are significantly different.

Caution about small sample sizes: Numerators <10 and denominators <50 should be suppressed and show as (IS) to indicate insufficient sample. Use caution in interpreting numerator sizes between 10 and 30.

Table 8. Self Reported Age[1] at First Heart Attack or Stroke, Washington, 2001

	With Cardiovascular Disease[2]			With Stroke[2]		
Age	n	%[3]	SE[4]	n	%[3]	SE[4]
18-34	14	10.3	2.9	IS	IS	IS
35-44	22	14.3	3.1	IS	IS	IS
45-54	31	24.9	4.2	13	16.2	4.4
55-64	30	23.3	4.0	17	19.9	4.6
65+	33	27.2	4.3	42	48.2	5.8
Total (N)	130	100.0		87	100.0	

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Among those told by doctor, nurse, or other health professional had heart attack or stroke.

[3]Weighted percents. Population weights were applied to data to account for sampling design of the BRFSS survey.

[4]Standard error.

Table 9. Prevalence of Select Risk Factors Among Adults[1] With and Without Cardiovascular Disease, Washington, 2001.

		With Cardiovascular Disease[2]			Without Cardiovascular Disease		
Risk Factor	Years	n/N	%[3]	95% CI[4]	n/N	%[3]	95% CI[4]
Smoking[5]	2000-2002	76/298	23.7	[19.0, 29.3]	835/3791	22.2	[20.7, 23.7]
Diabetes	2000-2002	62/300	21.2	[16.6, 26.6]	173/3802	4.4	[3.8, 5.2]
Obesity[6]	2000-2002	80/287	27.6	[22.4, 33.5]	700/3656	18.8	[17.4, 20.2]
Insufficient Leisure Time Physical Activity[7]	2001	163/271	58.3	[51.7, 64.5]	1585/3630	43.5	[41.7, 45.4]
High Blood Pressure	1999, 2001	189/299	62.9	[56.8, 68.7]	808/3794	21.0	[19.6, 22.4]
High Cholesterol	1999, 2001	168/277	57.9	[51.4, 64.1]	785/2887	26.1	[24.4, 27.9]
Eat fruits & vegetables < 5 times a day	1998, 2000, 2002	165/229	74.7	[68.0, 80.3]	2444/3315	74.1	[72.3, 75.8]

Data Source: Washington Behavioral Risk Factor Surveillance System (BRFSS) 1990 through 2002.

[1]Age 18 years or older.

[2]Told by doctor, nurse, or other health professional that they had a heart attack, angina, coronary heart disease, or a stroke.

[3]Weighted percent. Population weights applied to data to account for sampling design of the BRFSS survey.

[4]95% Confidence Interval.

[5]Currently smoke cigarettes.

[6]Defined as body mass index ≥30.0 kg/m^2, as calculated from self-reported heights and weights.

[7]Did not meet current physical activity (PA) recommendations of 5 or more days per week of moderate physical activity for at least 30 minutes each day, or 3 or more days per week of vigorous physical activity for at least 20 minutes each day.

[8]From BRFSS 1998, earliest year when both cardiovascular disease awareness and fruit & vegetable intake included on the same survey.

Notes:

When 95% Confidence Intervals of two percentages overlap, and include either point estimate, the two percentages are NOT statistically significantly different. When 95% CI's overlap, but do not include either point estimate, the two percentages may or may not be significantly different and further statistical tests are needed to determine significance, such as Pearson's Chi-Square test. If the 95% CI's do not overlap, the percentages are significantly different.

Caution regarding small sample sizes: Numerators <10 and denominators <50 should be suppressed and show as (IS) to indicate insufficient sample. Use caution in interpreting numerator sizes between 10 and 30.

Table 10. Hospitalizations for Heart Disease and Stroke by Sex, Washington 2002

	Heart Disease[1]				Stroke[2]			
Discharged	First-listed Diagnosis		Any Diagnosis		First-listed Diagnosis		Any Diagnosis	
	Count	% of total	Count	% of total	Count	% of total	Count	% of total
Total	52,680	9.4%	142,055	25.3%	11,520	2.0%	25,311	4.5%
Males	29,417	13.1%	72,370	32.1%	5,460	2.4%	11,997	5.3%
Females	23,263	6.9%	69,685	20.7%	6,060	1.8%	13,314	3.9%

Data Source: CHARS 2002

[1]Hospitalization with first-listed or any diagnosis of heart disease (includes ICD-9 diagnosis code 390-398, 402, 404, 410-429).

[2]Hospitalization with first-listed or any diagnosis of stroke (includes ICD-9 diagnosis code 430-434, 436-438).

Table 11. Hospitalizations with Coronary Heart Disease[1], Washington Residents, 2000-2002

County	Total population[1]	Total number of hospital discharges	Crude rate per 1,000 total population	Age-standardized rate[3] per 1,000 total population [95% CI][4]	
Washington	17,910,720	221,504	12.4	13.3	[13.2, 13.3]
Adams	49,628	760	15.3	18.4	[17.1, 19.6]
Asotin	61,952	630	10.2	8.3	[7.6, 8.9]
Benton	434,877	5,014	11.5	13.4	[13.0, 13.7]
Chelan	201,316	2,537	12.6	11.4	[11.0, 11.8]
Clallam	193,534	4,630	23.9	15.2	[14.8, 15.7]
Clark	1,061,239	9,319	8.8	10.8	[10.6, 11.0]
Columbia	12,263	331	27.0	18.5	[16.6, 20.4]
Cowlitz	281,249	4,119	14.6	13.6	[13.2, 14.0]
Douglas	98,503	1,097	11.1	11.1	[10.4, 11.7]
Ferry	21,860	436	19.9	20.1	[18.3, 21.9]
Franklin	151,048	1,700	11.3	16.2	[15.4, 16.9]
Garfield	7,196	84	11.7	7.5	[5.9, 9.1]
Grant	226,999	3,063	13.5	14.9	[14.4, 15.5]
Grays Harbor	204,094	5,634	27.6	23.1	[22.5, 23.7]
Island	217,058	3,123	14.4	13.0	[12.6, 13.4]
Jefferson	79,348	1,711	21.6	13.9	[13.2, 14.5]
King	5,269,634	58,958	11.2	12.5	[12.4, 12.6]
Kitsap	700,068	7,802	11.1	12.4	[12.1, 12.6]
Kittitas	102,163	1,383	13.5	14.3	[13.6, 15.0]
Klickitat	57,761	612	10.6	9.5	[8.7, 10.2]
Lewis	208,301	3,880	18.6	15.4	[15.0, 15.9]
Lincoln	30,585	723	23.6	16.0	[14.9, 17.1]
Mason	148,806	2,977	20.0	16.0	[15.5, 16.6]
Okanogan	119,064	1,666	14.0	12.6	[12.0, 13.2]
Pacific	62,985	1,355	21.5	12.9	[12.3, 13.6]
Pend Oreille	35,333	742	21.0	17.7	[16.5, 18.9]
Pierce	2,139,220	27,288	12.8	15.0	[14.8, 15.1]
San Juan	43,077	414	9.6	6.3	[5.7, 6.9]
Skagit	312,179	4,167	13.3	11.7	[11.3, 12.0]
Skamania	29,671	158	5.3	5.7	[4.8, 6.6]
Snohomish	1,852,625	20,557	11.1	14.0	[13.8, 14.1]
Spokane	1,265,940	14,694	11.6	11.5	[11.4, 11.7]
Stevens	120,766	2,114	17.5	16.5	[15.8, 17.1]
Thurston	629,856	8,187	13.0	13.6	[13.3, 13.9]
Wahkiakum	11,426	210	18.4	12.8	[11.1, 14.5]
Walla Walla	165,781	2,265	13.7	12.1	[11.6, 12.5]
Whatcom	509,615	7,031	13.8	14.5	[14.2, 14.9]
Whitman	121,640	1,185	9.7	13.0	[12.3, 13.7]
Yakima	672,083	8,948	13.3	14.7	[14.4, 15.0]

Data Source: CHARS 2000-2002

[1]Hospital discharge with any diagnosis of coronary (ischemic) heart disease (includes ICD-9 diagnosis codes 410-414, 429.2).

[2]Population data from Washington State Department of Health, Center for Health Statistics (issued November 2003).

[3]Age standardized to the U.S. 2000 standard population using the following age groupings: <1,1-4,5-14, 15-24 25-34,35-44,45-54,55-64,65-74,75-84,85+ years.

[4]Confidence Interval.

Table 12. Hospitalizations with Diseases of the Heart,[1] Washington Residents, 2000-2002.

County	Total population[1]	Total number of hospital discharges	Crude rate per 1,000 total population	Age-standardized rate[3] per 1,000 total population [95% CI][4]	
Washington	17,910,720	417,958	23.3	25.0	[24.9, 25.1]
Adams	49,628	1,315	26.5	31.7	[30.2, 33.3]
Asotin	61,952	1,143	18.4	14.7	[13.9, 15.6]
Benton	434,877	9,774	22.5	26.3	[25.8, 26.8]
Chelan	201,316	5,244	26.0	23.5	[22.9, 24.1]
Clallam	193,534	8,779	45.4	29.3	[28.7, 29.9]
Clark	1,061,239	16,807	15.8	19.6	[19.3, 19.8]
Columbia	12,263	582	47.5	32.7	[30.4, 35.1]
Cowlitz	281,249	7,252	25.8	24.1	[23.5, 24.6]
Douglas	98,503	2,205	22.4	22.4	[21.5, 23.2]
Ferry	21,860	751	34.4	35.4	[33.2, 37.7]
Franklin	151,048	3,075	20.4	29.1	[28.2, 30.1]
Garfield	7,196	169	23.5	14.9	[12.7, 17.1]
Grant	226,999	5,872	25.9	28.7	[28.1, 29.4]
Grays Harbor	204,094	9,793	48.0	40.4	[39.7, 41.1]
Island	217,058	5,414	24.9	22.8	[22.2, 23.4]
Jefferson	79,348	3,137	39.5	25.9	[25.0, 26.7]
King	5,269,634	114,257	21.7	24.0	[23.9, 24.2]
Kitsap	700,068	15,448	22.1	24.6	[24.2, 24.9]
Kittitas	102,163	2,425	23.7	24.9	[24.0, 25.8]
Klickitat	57,761	1,167	20.2	18.2	[17.3, 19.2]
Lewis	208,301	7,379	35.4	29.3	[28.7, 29.9]
Lincoln	30,585	1,494	48.8	32.9	[31.4, 34.5]
Mason	148,806	5,473	36.8	30.2	[29.4, 30.9]
Okanogan	119,064	3,267	27.4	24.9	[24.1, 25.7]
Pacific	62,985	2,578	40.9	25.1	[24.2, 26.0]
Pend Oreille	35,333	1,412	40.0	35.4	[33.7, 37.0]
Pierce	2,139,220	49,710	23.2	27.2	[27.0, 27.4]
San Juan	43,077	877	20.4	13.8	[12.9, 14.7]
Skagit	312,179	8,709	27.9	24.3	[23.8, 24.8]
Skamania	29,671	346	11.7	12.9	[11.6, 14.2]
Snohomish	1,852,625	37,644	20.3	25.5	[25.3, 25.8]
Spokane	1,265,940	29,422	23.2	22.9	[22.7, 23.2]
Stevens	120,766	3,906	32.3	30.8	[29.9, 31.7]
Thurston	629,856	14,911	23.7	24.8	[24.4, 25.2]
Wahkiakum	11,426	357	31.2	22.2	[20.0, 24.4]
Walla Walla	165,781	4,392	26.5	22.8	[22.2, 23.5]
Whatcom	509,615	12,697	24.9	26.2	[25.7, 26.6]
Whitman	121,640	2,396	19.7	25.9	[24.9, 26.8]
Yakima	672,083	16,379	24.4	26.7	[26.3, 27.0]

Data Source: CHARS 2000-2002

[1]Hospital discharge with any diagnosis of diseases of the heart (includes ICD-9 diagnosis codes 390-398, 402, 404, 410-429).

[2]Population data from Washington State Department of Health, Center for Health Statistics (issued November 2003).

[3]Age standardized to the U.S. 2000 standard population using the following age groupings: <1,1-4,5-14, 15-24 25-34,35-44,45-54,55-64,65-74,75-84,85+ years.

[4]Confidence Interval.

Table 13. Hospitalizations with Stroke[1], Washington Residents, 2000-2002.

County	Total population[1]	Total number of hospital discharges	Crude rate per 1,000 total population	Age-standardized rate[3] per 1,000 total population [95% CI][4]	
Washington	17,910,720	75,611	4.2	4.5	[4.5, 4.6]
Adams	49,628	226	4.6	5.5	[4.8, 6.2]
Asotin	61,952	228	3.7	2.8	[2.4, 3.2]
Benton	434,877	1,763	4.1	4.8	[4.6, 5.0]
Chelan	201,316	998	5.0	4.4	[4.2, 4.7]
Clallam	193,534	1,441	7.4	4.7	[4.4, 4.9]
Clark	1,061,239	3,299	3.1	3.9	[3.7, 4.0]
Columbia	12,263	99	8.1	5.6	[4.5, 6.6]
Cowlitz	281,249	948	3.4	3.1	[2.9, 3.3]
Douglas	98,503	404	4.1	4.1	[3.7, 4.5]
Ferry	21,860	127	5.8	5.9	[4.9, 7.0]
Franklin	151,048	580	3.8	5.5	[5.1, 5.9]
Garfield	7,196	22	3.1	1.8	[1.1, 2.6]
Grant	226,999	944	4.2	4.6	[4.3, 4.9]
Grays Harbor	204,094	1,418	6.9	5.8	[5.5, 6.1]
Island	217,058	865	4.0	3.6	[3.4, 3.9]
Jefferson	79,348	498	6.3	4.1	[3.7, 4.4]
King	5,269,634	21,149	4.0	4.5	[4.4, 4.5]
Kitsap	700,068	2,606	3.7	4.2	[4.0, 4.4]
Kittitas	102,163	395	3.9	4.1	[3.7, 4.5]
Klickitat	57,761	165	2.9	2.6	[2.2, 3.0]
Lewis	208,301	1,598	7.7	6.3	[6.0, 6.6]
Lincoln	30,585	209	6.8	4.7	[4.1, 5.4]
Mason	148,806	888	6.0	4.9	[4.6, 5.2]
Okanogan	119,064	568	4.8	4.3	[4.0, 4.7]
Pacific	62,985	468	7.4	4.6	[4.1, 5.0]
Pend Oreille	35,333	224	6.3	5.7	[5.0, 6.5]
Pierce	2,139,220	9,004	4.2	5.0	[4.9, 5.1]
San Juan	43,077	154	3.6	2.4	[2.0, 2.8]
Skagit	312,179	1,619	5.2	4.5	[4.3, 4.7]
Skamania	29,671	69	2.3	2.7	[2.1, 3.4]
Snohomish	1,852,625	7,058	3.8	4.9	[4.8, 5.0]
Spokane	1,265,940	5,584	4.4	4.3	[4.2, 4.5]
Stevens	120,766	556	4.6	4.5	[4.1, 4.8]
Thurston	629,856	2,637	4.2	4.4	[4.2, 4.6]
Wahkiakum	11,426	54	4.7	3.3	[2.4, 4.2]
Walla Walla	165,781	841	5.1	4.2	[3.9, 4.5]
Whatcom	509,615	2,496	4.9	5.2	[5.0, 5.4]
Whitman	121,640	389	3.2	4.2	[3.8, 4.6]
Yakima	672,083	3,020	4.5	4.9	[4.7, 5.1]

Data Source: CHARS 2000-2002

[1]Hospital discharge with any diagnosis of stroke (includes ICD-9 diagnosis codes 430-434, 436-438).

[2]Population data from Washington State Department of Health, Center for Health Statistics (issued November 2003).

[3]Age standardized to the U.S. 2000 standard population using the following age groupings: <1,1-4,5-14, 15-24 25-34,35-44,45-54,55-64,65-74,75-84,85+ years.

[4]Confidence Interval.

Table 14. Discharge Status of Hospitalizations for CVD-related and Other Conditions, by First-Listed Diagnosis, Washington, 2002.

	CVD[1]		Coronary Heart Disease		Stroke		Other Diagnosis	
Status	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Total discharges	70,050	100%	25,481	100%	11520	100%	492,209	100%
Discharged to home or self-care (routine discharge)	45,771	65.3%	18,168	71.3%	4,798	41.6%	398,213	80.9%
Discharged to home with care	4,795	6.8%	1,310	5.1%	757	6.6%	25,663	5.2%
Discharged to skilled nursing facility (Medicare certified, or Medicaid-certified (but not Medicare))	8,627	12.3%	1,743	6.8%	2788	24.2%	36,961	7.5%
Discharged to intermediate care facility	404	0.6%	98	0.4%	100	0.9%	1,881	0.4%
Discharged to other short-term institution	5,668	8.1%	2980	11.7%	1,311	11.4%	15,141	3.1%
Left against medical advice	233	0.3%	95	0.4%	16	0.1%	2,999	0.6%
Died	3,450	4.9%	944	3.7%	1,012	8.8%	8,526	1.7%
Hospice at home or in a medical facility	91	0.1%	16	0.1%	35	0.3%	478	0.1%
Discharged within institution to Medicare-approved swingbed	21	0.0%	7	0.0%	7	0.1%	78	0.0%
Discharged to inpatient rehabilitation facility	941	1.3%	112	0.4%	679	5.9%	2,061	0.4%
Discharged to Medicare-certified long-term care hospital	49	0.1%	8	0.0%	17	0.1%	208	0.0%

Data Source: CHARS 2002

[1]Hospitalization with first-listed diagnosis of major cardiovascular disease (includes ICD-9 diagnosis code 390-434, 436-448).

Figure 15. Frequency of Discharges to Skilled Nursing Facilities (SNF) for Cardiovascular Disease Hospitalizations by Age, Washington, 2002

	First-listed diagnosis CVD[1]	
Age	**Number**	**%**
Total discharges all ages	8627	100%
0-44 years	100	1.2%
45-64 years	759	8.8%
65-84 years	4,944	57.3%
85+ years	2,824	32.7%

Data Source: CHARS 2002

[1]Hospitalization with first-listed diagnosis of major cardiovascular disease (includes ICD-9 diagnosis code 390-434, 436-448).

Table 16. Frequency of Death during Hospitalizations for Cardiovascular Disease-related Conditions by Age and Sex, Washington, 2002

	Total discharges with expired status	0-44 years		45-64 years		65-84 years		85+ years	
Disease/Condition	**Number**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
First-listed diagnosis major CVD[1]	3450	121	3.5%	568	16.5%	1874	54.3%	887	25.7%
First-listed diagnosis coronary heart disease[2]	944	14	1.5%	130	13.8%	537	56.9%	263	27.9%
First-listed diagnosis stroke[3]	1012	45	4.4%	196	19.4%	518	51.2%	253	25.0%
First-listed diagnosis congestive heart failure[4]	516	11	2.1%	47	9.1%	272	52.7%	186	36.0%

Data Source: CHARS 2002

[1]Hospitalization with first-listed diagnosis of major cardiovascular disease (includes ICD-9 diagnosis code 390-434, 436-448).

[2]Hospitalization with first-listed diagnosis of coronary heart disease (includes ICD-9 diagnosis code 410-414, 429.2).

[3]Hospitalization with first-listed diagnosis of stroke (includes ICD-9 diagnosis code 430-434, 436-438).

[4]Hospitalization with first-listed diagnosis of congestive heart failure (includes ICD-9 diagnosis code 428.0).

Table 17. Trends in Cardiovascular Disease Mortality, Washington State Residents and United States, 1990-2002

Year	Population	Crude Rate (per 100,000)	Age-Adjusted Rate[1] (per 100,000)	Standard Error	95% Confidence Interval	United States Age-Adjusted Rate[1] (per 100,000)
1990	4,866,692	308.2	368.7	3.0	(362.9 , 374.5)	409.7
1991	5,021,335	299.1	355.9	2.9	(350.3 , 361.5)	397.3
1992	5,141,177	296.2	350.3	2.8	(344.8 , 355.7)	387.1
1993	5,265,688	307.2	362.3	2.8	(356.8 , 367.8)	392.8
1994	5,364,338	287.6	335.2	2.7	(330.0 , 340.4)	381.8
1995	5,470,104	287.4	333.3	2.6	(328.2 , 338.4)	378.0
1996	5,567,764	294.4	336.4	2.6	(331.3 , 341.4)	369.6
1997	5,663,763	275.3	311.3	2.4	(306.5 , 316.1)	359.9
1998*	5,750,033	277.8	309.6	2.4	(304.9 , 314.4)	351.3
1999	5,830,835	280.1	308.4	2.4	(303.7 , 313.0)	349.3
2000	5,894,121	274.9	299.1	2.3	(294.6 , 303.6)	339.7
2001	5,974,900	269.8	290.3	2.2	(285.9 , 294.7)	325.2
2002	6,041,710	265.6	281.6	2.2	(277.3 , 285.9)	N/A

Sources:

A) Washington State Department of Health Death Files, 1990-2002

B) United States rates based on the Center for Disease Control and Prevention Wonder query system

C) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9981 applied to 1990-1998 rates

Notes:

A) Causes of death were coded with ICD-9 codes 390-434, 436-448. ICD-10 codes include: I00-I78

B) Year 2010 Objective comparison not included due to no 2010 Objective for overall Cardiovascular Disease

C) United States 2002 Data not available at time report was produced

Table 18. Trends in Coronary Heart Disease Mortality Washington State Residents and United States, 1990-2002

Year	Population	Crude Rate (per 100,000)	Age-Adjusted Rate[1] (per 100,000)	Standard Error	95% Confidence Interval	United States Age-Adjusted Rate[1] (per 100,000)	Healthy People 2010 Objective
1990	4,866,692	180.3	214.4	2.3	(209.9 , 218.8)	249.4	166.0
1991	5,021,335	173.5	204.9	2.2	(200.6 , 209.2)	240.4	166.0
1992	5,141,177	169.2	198.8	2.1	(194.6 , 203.0)	232.4	166.0
1993	5,265,688	174.7	204.8	2.1	(200.7 , 209.0)	233.0	166.0
1994	5,364,338	160.5	186.2	2.0	(182.2 , 190.1)	224.3	166.0
1995	5,470,104	157.4	181.9	1.9	(178.1 , 185.7)	219.5	166.0
1996	5,567,764	160.4	182.7	1.9	(179.0 , 186.5)	211.9	166.0
1997	5,663,763	147.3	166.2	1.8	(162.6 , 169.7)	203.4	166.0
1998*	5,750,033	148.2	165.0	1.8	(161.6 , 168.5)	196.9	166.0
1999	5,830,835	148.3	163.2	1.7	(159.8 , 166.6)	194.6	166.0
2000	5,894,121	146.1	159.1	1.7	(155.7 , 162.4)	186.7	166.0
2001	5,974,900	140.9	151.8	1.6	(148.6 , 155.1)	177.8	166.0
2002	6,041,710	137.5	145.7	1.6	(142.6 , 148.9)	N/A	166.0

Sources:

A) Washington State Department of Health Death Files, 1990-2002

B) United States rates based on the Center for Disease Control and Prevention Wonder query system

C) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9990 applied to 1990-1998 rates

Notes:

A) U.S. and Washington causes of death were coded with ICD-9 codes 410-414, 429.2 and ICD-10 codes I20-I25

B) Healthy People 2010 uses ICD-9 codes 402,410-414, and 429.2. ICD-10 codes include: I11, I20-I25

C) United States 2002 Data not available at time report was produced

Table 19. Trends in Stroke Mortality
Washington State Residents and United States, 1990-2002

Year	Population	Crude Rate (per 100,000)	Age-Adjusted Rate[1] (per 100,000)	Standard Error	95% Confidence Interval	United States Age-Adjusted Rate[1] (per 100,000)	Healthy People 2010 Objective
1990	4,866,692	59.1	72.1	1.3	(69.5 , 74.8)	69.1	48.0
1991	5,021,335	59.0	71.7	1.3	(69.1 , 74.3)	66.6	48.0
1992	5,141,177	60.6	72.9	1.3	(70.3 , 75.4)	65.1	48.0
1993	5,265,688	64.3	76.8	1.3	(74.3 , 79.4)	66.4	48.0
1994	5,364,338	61.9	73.1	1.3	(70.7 , 75.6)	66.3	48.0
1995	5,470,104	63.7	74.6	1.3	(72.1 , 77.1)	66.8	48.0
1996	5,567,764	67.1	77.3	1.3	(74.9 , 79.8)	66.2	48.0
1997	5,663,763	62.9	71.6	1.2	(69.3 , 73.9)	64.7	48.0
1998	5,750,033	62.7	70.2	1.2	(67.9 , 72.5)	62.8	48.0
1999	5,830,835	63.5	70.2	1.1	(68.0 , 72.5)	61.6	48.0
2000	5,894,121	62.9	68.6	1.1	(66.4 , 70.8)	60.8	48.0
2001	5,974,900	62.9	67.8	1.1	(65.7 , 70.0)	57.9	48.0
2002	6,041,710	62.2	66.1	1.1	(64.0 , 68.2)	N/A	48.0

Sources:

A) Washington State Department of Health Death Files, 1990-2002

B) United States rates based on the Center for Disease Control and Prevention Wonder query system

C) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 1.0588 applied to 1990-1998 rates

Notes:

A) Causes of death were coded with ICD-9 codes 430-434,436-438. ICD-10 codes include: I60-I69

B) United States 2002 Data not available at time report was produced

Table 20. Trends in Age-adjusted Cardiovascular Disease Mortality Rates by Sex, Washington State Residents, 1990-2002

Sex	Year	Population	Crude Rate (per 100,000)	Age-Adjusted Rate[2] (per 100,000)	Standard Error	95% Confidence Interval
Male	1990	2,413,747	306.2	453.4	5.4	(442.8 , 463.9)
	1991	2,492,597	299.2	439.7	5.2	(429.6 , 449.9)
	1992	2,553,644	296.2	434.4	5.1	(424.5 , 444.4)
	1993	2,617,082	305.4	449.1	5.1	(439.2 , 459.1)
	1994	2,667,312	284.5	410.7	4.8	(401.4 , 420.1)
	1995	2,721,228	278.8	403.0	4.7	(393.8 , 412.1)
	1996	2,771,001	292.3	417.6	4.7	(408.5 , 426.8)
	1997	2,819,918	272.8	385.1	4.4	(376.4 , 393.7)
	1998*	2,863,846	271.6	379.7	4.3	(371.3 , 388.2)
	1999	2,904,938	268.5	372.8	4.2	(364.5 , 381.0)
	2000	2,934,300	268.1	363.7	4.1	(355.7 , 371.7)
	2001	2,975,115	261.5	349.2	3.9	(341.4 , 356.9)
	2002	3,008,776	259.0	343.1	3.9	(335.5 , 350.6)
Female	1990	2,452,945	310.1	303.8	3.4	(297.1 , 310.5)
	1991	2,528,738	299.0	292.0	3.3	(285.5 , 298.5)
	1992	2,587,533	296.0	286.4	3.2	(280.1 , 292.7)
	1993	2,648,606	309.0	297.0	3.2	(290.7 , 303.3)
	1994	2,697,026	290.7	276.3	3.1	(270.3 , 282.3)
	1995	2,748,876	295.8	278.9	3.0	(273.0 , 284.9)
	1996	2,796,763	296.6	275.3	3.0	(269.5 , 281.2)
	1997	2,843,845	277.8	255.5	2.8	(249.9 , 261.1)
	1998	2,886,187	283.8	257.2	2.8	(251.7 , 262.7)
	1999	2,925,897	291.5	259.8	2.8	(254.4 , 265.3)
	2000	2,959,821	281.6	250.1	2.7	(244.8 , 255.4)
	2001	2,999,785	278.0	244.7	2.7	(239.5 , 249.9)
	2002	3,032,934	272.1	235.6	2.6	(230.6 , 240.7)
Total	1990	4,866,692	308.2	368.7	3.0	(362.9 , 374.5)
	1991	5,021,335	299.1	355.9	2.9	(350.3 , 361.5)
	1992	5,141,177	296.2	350.3	2.8	(344.8 , 355.7)
	1993	5,265,688	307.2	362.3	2.8	(356.8 , 367.8)
	1994	5,364,338	287.6	335.2	2.7	(330.0 , 340.4)
	1995	5,470,104	287.4	333.3	2.6	(328.2 , 338.4)
	1996	5,567,764	294.4	336.4	2.6	(331.3 , 341.4)
	1997	5,663,763	275.3	311.3	2.4	(306.5 , 316.1)
	1998	5,750,033	277.8	309.6	2.4	(304.9 , 314.4)
	1999	5,830,835	280.1	308.4	2.4	(303.7 , 313.0)
	2000	5,894,121	274.9	299.1	2.3	(294.6 , 303.6)
	2001	5,974,900	269.8	290.3	2.2	(285.9 , 294.7)
	2002	6,041,710	265.6	281.6	2.2	(277.3 , 285.9)

Sources:

A) Washington State Department of Health Death Files, 1990-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1]CVD=Cardiovascular Disease

[2] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9981 applied to 1990-1998 rates.

Note:

Causes of death were coded with ICD-9 codes 390-434, 436-448. ICD-10 codes include: I00-I78

Table 21. Trends in Age-adjusted Coronary Heart Disease Mortality Rates by Sex, Washington State Residents, 1990-2002

Gender	Year	Population	Crude Rate (per 100,000)	Age-Adjusted Rate[2] (per 100,000)	Standard Error	95% Confidence Interval
Male	1990	2,413,747	195.2	283.9	4.3	(275.6 , 292.3)
	1991	2,492,597	190.1	272.9	4.1	(264.9 , 281.0)
	1992	2,553,644	187.8	269.9	4.0	(262.1 , 277.7)
	1993	2,617,082	190.7	274.5	4.0	(266.7 , 282.3)
	1994	2,667,312	177.0	248.8	3.7	(241.6 , 256.1)
	1995	2,721,228	169.5	240.7	3.6	(233.6 , 247.8)
	1996	2,771,001	178.0	250.3	3.6	(243.2 , 257.4)
	1997	2,819,918	161.8	224.4	3.4	(217.8 , 231.0)
	1998*	2,863,846	163.1	224.5	3.3	(218.0 , 231.0)
	1999	2,904,938	159.7	217.7	3.2	(211.4 , 224.0)
	2000	2,934,300	159.8	213.1	3.1	(207.0 , 219.3)
	2001	2,975,115	155.5	204.7	3.0	(198.7 , 210.6)
	2002	3,008,776	154.3	200.3	3.0	(194.5 , 206.1)
Female	1990	2,452,945	165.7	162.2	2.5	(157.3 , 167.2)
	1991	2,528,738	157.2	153.7	2.4	(148.9 , 158.4)
	1992	2,587,533	150.8	146.0	2.3	(141.5 , 150.6)
	1993	2,648,606	158.8	152.9	2.3	(148.3 , 157.5)
	1994	2,697,026	144.2	137.4	2.2	(133.1 , 141.7)
	1995	2,748,876	145.3	137.2	2.2	(132.9 , 141.4)
	1996	2,796,763	143.1	133.1	2.1	(129.0 , 137.2)
	1997	2,843,845	132.8	122.6	2.0	(118.7 , 126.5)
	1998	2,886,187	133.4	121.6	2.0	(117.7 , 125.4)
	1999	2,925,897	137.0	123.1	1.9	(119.3 , 126.9)
	2000	2,959,821	132.6	118.4	1.9	(114.7 , 122.1)
	2001	2,999,785	126.5	112.0	1.8	(108.4 , 115.6)
	2002	3,032,934	120.8	104.9	1.7	(101.5 , 108.3)
Total	1990	4,866,692	180.3	214.4	2.3	(209.9 , 218.8)
	1991	5,021,335	173.5	204.9	2.2	(200.6 , 209.2)
	1992	5,141,177	169.2	198.8	2.1	(194.6 , 203.0)
	1993	5,265,688	174.7	204.8	2.1	(200.7 , 209.0)
	1994	5,364,338	160.5	186.2	2.0	(182.2 , 190.1)
	1995	5,470,104	157.4	181.9	1.9	(178.1 , 185.7)
	1996	5,567,764	160.4	182.7	1.9	(179.0 , 186.5)
	1997	5,663,763	147.3	166.2	1.8	(162.6 , 169.7)
	1998	5,750,033	148.2	165.0	1.8	(161.6 , 168.5)
	1999	5,830,835	148.3	163.2	1.7	(159.8 , 166.6)
	2000	5,894,121	146.1	159.1	1.7	(155.7 , 162.4)
	2001	5,974,900	140.9	151.8	1.6	(148.6 , 155.1)
	2002	6,041,710	137.5	145.7	1.6	(142.6 , 148.9)

Sources:

A) Washington State Department of Health Death Files, 1990-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1]CHD=Coronary Heart Disease

[2] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9990 applied to 1990-1998 rates.

Note:

Causes of death were coded with ICD-9 codes 410-414,429.2. ICD-10 codes include: I20-I25

Table 22. Trends in Age-adjusted Stroke Mortality Rates by Sex, Washington State Residents, 1990-2002

Year	Gender	Population	Crude Rate (per 100,000)	Age-Adjusted Rate[1] (per 100,000)	Standard Error	95% Confidence Interval
1990	Male	2,413,747	47.6	76.0	2.3	(71.4 , 80.6)
1991	Male	2,492,597	46.3	72.5	2.2	(68.2 , 76.9)
1992	Male	2,553,644	46.9	72.9	2.2	(68.6 , 77.2)
1993	Male	2,617,082	52.8	81.8	2.3	(77.3 , 86.2)
1994	Male	2,667,312	48.1	74.7	2.1	(70.5 , 78.9)
1995	Male	2,721,228	49.2	75.1	2.1	(71.0 , 79.3)
1996	Male	2,771,001	52.0	78.2	2.1	(74.1 , 82.4)
1997	Male	2,819,918	50.6	75.3	2.0	(71.3 , 79.3)
1998*	Male	2,863,846	48.3	70.7	1.9	(66.9 , 74.5)
1999	Male	2,904,938	49.6	72.0	1.9	(68.2 , 75.7)
2000	Male	2,934,300	50.8	72.3	1.9	(68.6 , 76.0)
2001	Male	2,975,115	48.9	67.9	1.8	(64.3 , 71.4)
2002	Male	3,008,776	48.5	67.4	1.8	(64.0 , 70.9)
1990	Female	2,452,945	70.5	69.1	1.7	(65.9 , 72.4)
1991	Female	2,528,738	71.4	69.7	1.6	(66.5 , 72.9)
1992	Female	2,587,533	74.0	71.5	1.6	(68.4 , 74.7)
1993	Female	2,648,606	75.6	72.5	1.6	(69.3 , 75.7)
1994	Female	2,697,026	75.5	71.4	1.6	(68.3 , 74.5)
1995	Female	2,748,876	77.9	73.2	1.6	(70.1 , 76.3)
1996	Female	2,796,763	82.0	75.7	1.6	(72.6 , 78.8)
1997	Female	2,843,845	74.9	68.3	1.5	(65.4 , 71.2)
1998	Female	2,886,187	76.9	69.3	1.5	(66.5 , 72.2)
1999	Female	2,925,897	77.4	68.3	1.4	(65.4 , 71.1)
2000	Female	2,959,821	75.0	66.1	1.4	(63.3 , 68.8)
2001	Female	2,999,785	76.8	67.0	1.4	(64.2 , 69.7)
2002	Female	3,032,934	75.8	65.0	1.4	(62.3 , 67.7)
1990	Total	4,866,692	59.1	72.1	1.3	(69.5 , 74.8)
1991	Total	5,021,335	59.0	71.7	1.3	(69.1 , 74.3)
1992	Total	5,141,177	60.6	72.9	1.3	(70.3 , 75.4)
1993	Total	5,265,688	64.3	76.8	1.3	(74.3 , 79.4)
1994	Total	5,364,338	61.9	73.1	1.3	(70.7 , 75.6)
1995	Total	5,470,104	63.7	74.6	1.3	(72.1 , 77.1)
1996	Total	5,567,764	67.1	77.3	1.3	(74.9 , 79.8)
1997	Total	5,663,763	62.9	71.6	1.2	(69.3 , 73.9)
1998	Total	5,750,033	62.7	70.2	1.2	(67.9 , 72.5)
1999	Total	5,830,835	63.5	70.2	1.1	(68.0 , 72.5)
2000	Total	5,894,121	62.9	68.6	1.1	(66.4 , 70.8)
2001	Total	5,974,900	62.9	67.8	1.1	(65.7 , 70.0)
2002	Total	6,041,710	62.2	66.1	1.1	(64.0 , 68.2)

Sources:

A) Washington State Department of Health Death Files, 1990-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 1.0588 applied to 1980-1998 rates.

Note:

Causes of death were coded with ICD-9 codes 430-434,436-438. ICD-10 codes include: I60-I69

Table 23. Cardiovascular Disease Death Rates by Age Groups, Washington State Residents, 2002

Disease	Age Group	Count of Deaths	Population	Crude Rate[3] (per 100,000)	Standard Error	95% Confidence Interval
CVD[1]	35-44 years	241	959,608	25.1	1.6	(21.9 , 28.3)
	45-54 years	705	896,573	78.6	3.0	(72.8 , 84.4)
	55-64 years	1,274	555,382	229.4	6.4	(216.8 , 242.0)
	65-74 years	2,296	340,869	673.6	14.1	(646.0 , 701.1)
	75-84 years	5,005	245,217	2041.0	28.9	(1984.5 , 2097.6)
	85 years or more	6,439	91,239	7057.3	87.9	(6884.9 , 7229.7)
CHD[2]	35-44 years	117	959,608	12.2	1.1	(10.0 , 14.4)
	45-54 years	433	896,573	48.3	2.3	(43.7 , 52.8)
	55-64 years	838	555,382	150.9	5.2	(140.7 , 161.1)
	65-74 years	1,347	340,869	395.2	10.8	(374.1 , 416.3)
	75-84 years	2,565	245,217	1046.0	20.7	(1005.5 , 1086.5)
	85 years or more	2,987	91,239	3273.8	59.9	(3156.4 , 3391.2)
Stroke	35-44 years	32	959,608	3.3	0.6	(2.3 , 4.7)
	45-54 years	86	896,573	9.6	1.0	(7.7 , 11.8)
	55-64 years	172	555,382	31.0	2.4	(26.3 , 35.6)
	65-74 years	419	340,869	122.9	6.0	(111.2 , 134.7)
	75-84 years	1,251	245,217	510.2	14.4	(481.9 , 538.4)
	85 years or more	1,782	91,239	1953.1	46.3	(1862.4 , 2043.8)

Sources:

A) Washington State Department of Health Death Files, 1980-2002

B) Population Estimates: Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, August 2002

[1]CVD=Cardiovascular Disease

[2]CHD=Coronary Heart Disease

[3] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

Note:

CVD causes of death were coded with ICD-10 codes I00-I78

CHD causes of death were coded with ICD-10 codes I20-I25

Stroke causes of death were coded with ICD-10 codes I60-I69

Table 24. Trends in Cardiovascular Disease Mortality Washington State Residents, by Age and Gender, 2000-2002

Age Group	Gender	3 Year Average Count of Deaths	3 Year Average Population	Crude Rate[1] (per 100,000)	Standard Error	95% Confidence Interval
0-44 years	Female	126	1,910,174	6.6	0.6	(5.4 , 7.7)
45-54 years	Female	195	439,789	44.3	3.2	(38.1 , 50.6)
55-64 years	Female	387	263,527	146.9	7.5	(132.2 , 161.5)
65-74 years	Female	923	180,377	511.7	16.8	(478.7 , 544.7)
75-84 years	Female	2,600	143,617	1810.4	35.5	(1740.8 , 1880.0)
years or m	Female	4,078	60,029	6793.4	106.4	(6584.9 , 7001.9)
0-44 years	Male	221	1,992,966	11.1	0.7	(9.6 , 12.6)
45-54 years	Male	504	434,565	116.0	5.2	(105.9 , 126.1)
55-64 years	Male	833	259,512	321.0	11.1	(299.2 , 342.8)
65-74 years	Male	1,472	158,445	929.0	24.2	(881.6 , 976.5)
75-84 years	Male	2,603	99,598	2613.5	51.2	(2513.1 , 2713.9)
years or m	Male	2,181	27,644	7889.6	168.9	(7558.5 , 8220.7)

Sources:

A) Washington State Department of Health Death Files, 2000-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

Note:

Causes of death were coded with ICD-10. Codes include: I00-I78

Table 25. Trends in Coronary Heart Disease Mortality
Washington State Residents, by Age and Gender, 2000-2002

Age Group	Gender	3 Year Average Count of Deaths	3 Year Average Population	Crude Rate[1] (per 100,000)	Standard Error	95% Confidence Interval
0-44 years	Female	31	1,910,174	1.6	0.3	(1.1 , 2.3)
45-54 years	Female	84	439,789	19.1	2.1	(15.2 , 23.6)
55-64 years	Female	202	263,527	76.7	5.4	(66.1 , 87.2)
65-74 years	Female	475	180,377	263.3	12.1	(239.7 , 287.0)
75-84 years	Female	1,197	143,617	833.5	24.1	(786.3 , 880.7)
85 years or more	Female	1,806	60,029	3008.5	70.8	(2869.8 , 3147.3)
0-44 years	Male	113	1,992,966	5.7	0.5	(4.6 , 6.7)
45-54 years	Male	336	434,565	77.3	4.2	(69.1 , 85.6)
55-64 years	Male	592	259,512	228.1	9.4	(209.7 , 246.5)
65-74 years	Male	973	158,445	614.1	19.7	(575.5 , 652.7)
75-84 years	Male	1,505	99,598	1511.1	39.0	(1434.7 , 1587.4)
85 years or more	Male	1,133	27,644	4098.5	121.8	(3859.9 , 4337.2)

Sources:

A) Washington State Department of Health Death Files, 2000-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

Note:

Causes of death were coded with ICD-10. Codes include: I20-I25

Table 26. Trends in Stroke Mortality
Washington State Residents, by Age and Gender, 2000-2002

Age Group	Gender	3 Year Average Count of Deaths	3 Year Average Population	Crude Rate[1] (per 100,000)	Standard Error	95% Confidence Interval
0-44 years	Female	30	1,910,174	1.6	0.3	(1.1 , 2.2)
45-54 years	Female	46	439,789	10.5	1.5	(7.7 , 14.0)
55-64 years	Female	76	263,527	28.8	3.3	(22.7 , 36.1)
65-74 years	Female	210	180,377	116.4	8.0	(100.7 , 132.2)
75-84 years	Female	741	143,617	516.0	19.0	(478.8 , 553.1)
85 years or more	Female	1,171	60,029	1950.7	57.0	(1839. , 2062.5)
0-44 years	Male	23	1,992,966	1.2	0.2	(0.7 , 1.7)
45-54 years	Male	51	434,565	11.7	1.6	(8.7 , 15.4)
55-64 years	Male	94	259,512	36.2	3.7	(29.3 , 44.3)
65-74 years	Male	218	158,445	137.6	9.3	(119.3 , 155.9)
75-84 years	Male	556	99,598	558.2	23.7	(511.8 , 604.6)
85 years or more	Male	526	27,644	1902.8	83.0	(1740.2 , 2065.4)

Sources:

A) Washington State Department of Health Death Files, 2000-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

Note:

Causes of death were coded with ICD-10. Codes include: I60-I69

Table 27. Trends in Cardiovascular Disease Mortality
Washington State Residents, by Age, 1980-2002

Year	Age Group	Count of Deaths	Population	Crude Rate[1] (per 100,000)	Standard Error	95% Confidence Interval
1980	65-74 years	3,576	263,347	1357.9	22.7	(1313.4 , 1402.4)
	75-84 years	4,661	126,739	3677.6	53.9	(3572.1 , 3783.2)
	85 years or more	4,273	41,476	10302.3	157.6	(9993.4 , 10611.2)
1981	65-74 years	3,389	271,770	1247.0	21.4	(1205.0 , 1289.0)
	75-84 years	4,582	130,680	3506.3	51.8	(3404.8 , 3607.8)
	85 years or more	4,364	42,666	10228.3	154.8	(9924.8 , 10531.8)
1982	65-74 years	3,587	278,947	1285.9	21.5	(1243.8 , 1328.0)
	75-84 years	4,678	134,510	3477.8	50.8	(3378.1 , 3577.5)
	85 years or more	4,347	43,716	9943.7	150.8	(9648.1 , 10239.3)
1983	65-74 years	3,567	287,226	1241.9	20.8	(1201.1 , 1282.6)
	75-84 years	4,685	139,404	3360.7	49.1	(3264.5 , 3457.0)
	85 years or more	4,418	44,712	9881.0	148.7	(9589.7 , 10172.4)
1984	65-74 years	3,511	294,228	1193.3	20.1	(1153.8 , 1232.8)
	75-84 years	4,904	144,166	3401.6	48.6	(3306.4 , 3496.8)
	85 years or more	4,643	45,892	10117.2	148.5	(9826.2 , 10408.2)
1985	65-74 years	3,497	301,647	1159.3	19.6	(1120.9 , 1197.7)
	75-84 years	4,796	149,011	3218.6	46.5	(3127.5 , 3309.6)
	85 years or more	4,599	47,050	9774.7	144.1	(9492.2 , 10057.2)
1986	65-74 years	3,352	309,306	1083.7	18.7	(1047.0 , 1120.4)
	75-84 years	4,743	154,122	3077.4	44.7	(2989.9 , 3165.0)
	85 years or more	4,536	48,791	9296.8	138.0	(9026.2 , 9567.3)
1987	65-74 years	3,348	317,141	1055.7	18.2	(1019.9 , 1091.4)
	75-84 years	4,848	160,755	3015.8	43.3	(2930.9 , 3100.7)
	85 years or more	4,540	50,087	9064.2	134.5	(8800.6 , 9327.9)
1988	65-74 years	3,459	323,345	1069.8	18.2	(1034.1 , 1105.4)
	75-84 years	4,944	166,752	2964.9	42.2	(2882.2 , 3047.5)
	85 years or more	4,841	51,634	9375.6	134.8	(9111.5 , 9639.7)
1989	65-74 years	3,098	329,174	941.1	16.9	(908.0 , 974.3)
	75-84 years	4,853	173,345	2799.6	40.2	(2720.9 , 2878.4)
	85 years or more	4,852	53,558	9059.3	130.1	(8804.4 , 9314.2)
1990	65-74 years	3,047	334,630	910.6	16.5	(878.2 , 942.9)
	75-84 years	4,917	181,347	2711.4	38.7	(2635.6 , 2787.2)
	85 years or more	4,861	55,427	8770.1	125.8	(8523.6 , 9016.6)
1991	65-74 years	3,189	340,906	935.4	16.6	(903.0 , 967.9)
	75-84 years	4,805	187,406	2564.0	37.0	(2491.5 , 2636.4)
	85 years or more	4,849	58,053	8352.7	120.0	(8117.6 , 8587.8)
1992	65-74 years	3,117	345,163	903.1	16.2	(871.3 , 934.8)
	75-84 years	4,970	192,933	2576.0	36.5	(2504.4 , 2647.6)
	85 years or more	4,956	60,721	8161.9	115.9	(7934.7 , 8389.2)
1993	65-74 years	3,164	348,018	909.1	16.2	(877.5 , 940.8)
	75-84 years	5,240	198,415	2640.9	36.5	(2569.4 , 2712.4)
	85 years or more	5,529	63,328	8730.7	117.4	(8500.6 , 8960.9)
1994	65-74 years	3,079	348,969	882.3	15.9	(851.1 , 913.5)
	75-84 years	5,087	204,408	2488.7	34.9	(2420.3 , 2557.0)
	85 years or more	5,171	65,999	7835.0	109.0	(7621.4 , 8048.5)
1995	65-74 years	2,795	350,502	797.4	15.1	(767.9 , 827.0)
	75-84 years	5,196	210,345	2470.2	34.3	(2403.1 , 2537.4)
	85 years or more	5,553	68,538	8102.1	108.7	(7889.0 , 8315.2)
1996	65-74 years	2,935	350,422	837.6	15.5	(807.3 , 867.9)
	75-84 years	5,434	217,120	2502.8	34.0	(2436.2 , 2569.3)
	85 years or more	5,804	71,847	8078.3	106.0	(7870.5 , 8286.1)
1997	65-74 years	2,708	346,821	780.8	15.0	(751.4 , 810.2)
	75-84 years	5,190	223,465	2322.5	32.2	(2259.3 , 2385.7)
	85 years or more	5,524	74,967	7368.6	99.1	(7174.3 , 7562.9)
1998	65-74 years	2,643	345,227	765.6	14.9	(736.4 , 794.8)
	75-84 years	5,264	229,108	2297.6	31.7	(2235.5 , 2359.7)
	85 years or more	5,850	78,375	7464.1	97.6	(7272.8 , 7655.4)
1999	65-74 years	2,522	343,198	734.9	14.6	(706.2 , 763.5)
	75-84 years	5,289	233,931	2260.9	31.1	(2200.0 , 2321.9)
	85 years or more	6,338	81,705	7757.2	97.4	(7566.2 , 7948.2)
2000	65-74 years	2,466	337,166	731.4	14.7	(702.5 , 760.3)
	75-84 years	5,305	240,897	2202.2	30.2	(2142.9 , 2261.4)
	85 years or more	6,197	84,085	7369.9	93.6	(7186.4 , 7553.4)
2001	65-74 years	2,423	338,449	715.9	14.5	(687.4 , 744.4)
	75-84 years	5,298	243,564	2175.2	29.9	(2116.6 , 2233.8)
	85 years or more	6,141	87,725	7000.3	89.3	(6825.2 , 7175.4)
2002	65-74 years	2,296	340,869	673.6	14.1	(646.0 , 701.1)
	75-84 years	5,005	245,217	2041.0	28.9	(1984.5 , 2097.6)
	85 years or more	6,439	91,239	7057.3	87.9	(6884.9 , 7229.7)

Sources:

A) Washington State Department of Health Death Files, 1980-2002

B) Population Estimates: Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, August 2002

[1]CVD=Cardiovascular Disease

[2] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9981 applied to 1980-1998 rates.

Note:

Causes of death were coded with ICD-9 codes 390-434, 436-448. ICD-10 codes include: I00-I78

Table 28. Trends in Age-adjusted CHD[1] Mortality Rates by Age Groups, Washington State Residents and United States, 1980-2002

Year	Age Group	Count of Deaths	Population	Crude Rate[2] (per 100,000)	Standard Error	95% Confidence Interval
1980	65-74 years	2,318	263,347	880.2	18.3	(844.4 , 916.0)
	75-84 years	2,767	126,739	2183.2	41.5	(2101.9 , 2264.6)
	85 years or more	2,348	41,476	5661.1	116.8	(5432.1 , 5890.1)
1981	65-74 years	2,164	271,770	796.3	17.1	(762.7 , 829.8)
	75-84 years	2,712	130,680	2075.3	39.9	(1997.2 , 2153.4)
	85 years or more	2,436	42,666	5709.5	115.7	(5482.7 , 5936.2)
1982	65-74 years	2,393	278,947	857.9	17.5	(823.5 , 892.2)
	75-84 years	2,838	134,510	2109.9	39.6	(2032.3 , 2187.5)
	85 years or more	2,509	43,716	5739.3	114.6	(5514.7 , 5963.9)
1983	65-74 years	2,357	287,226	820.6	16.9	(787.5 , 853.7)
	75-84 years	2,819	139,404	2022.2	38.1	(1947.5 , 2096.8)
	85 years or more	2,530	44,712	5658.4	112.5	(5437.9 , 5878.9)
1984	65-74 years	2,269	294,228	771.2	16.2	(739.4 , 802.9)
	75-84 years	2,927	144,166	2030.3	37.5	(1956.7 , 2103.9)
	85 years or more	2,638	45,892	5748.3	111.9	(5528.9 , 5967.6)
1985	65-74 years	2,285	301,647	757.5	15.8	(726.4 , 788.6)
	75-84 years	2,872	149,011	1927.4	36.0	(1856.9 , 1997.9)
	85 years or more	2,570	47,050	5462.3	107.7	(5251.1 , 5673.5)
1986	65-74 years	2,198	309,306	710.6	15.2	(680.9 , 740.3)
	75-84 years	2,870	154,122	1862.2	34.8	(1794.0 , 1930.3)
	85 years or more	2,520	48,791	5164.9	102.9	(4963.2 , 5366.5)
1987	65-74 years	2,139	317,141	674.5	14.6	(645.9 , 703.0)
	75-84 years	2,866	160,755	1782.8	33.3	(1717.6 , 1848.1)
	85 years or more	2,523	50,087	5037.2	100.3	(4840.7 , 5233.8)
1988	65-74 years	2,281	323,345	705.4	14.8	(676.5 , 734.4)
	75-84 years	2,931	166,752	1757.7	32.5	(1694.1 , 1821.3)
	85 years or more	2,622	51,634	5078.0	99.2	(4883.7 , 5272.4)
1989	65-74 years	2,038	329,174	619.1	13.7	(592.2 , 646.0)
	75-84 years	2,837	173,345	1636.6	30.7	(1576.4 , 1696.8)
	85 years or more	2,591	53,558	4837.7	95.0	(4651.5 , 5024.0)
1990	65-74 years	1,917	334,630	572.9	13.1	(547.2 , 598.5)
	75-84 years	2,905	181,347	1601.9	29.7	(1543.6 , 1660.2)
	85 years or more	2,573	55,427	4642.1	91.5	(4462.8 , 4821.5)
1991	65-74 years	2,063	340,906	605.2	13.3	(579.0 , 631.3)
	75-84 years	2,789	187,406	1488.2	28.2	(1433.0 , 1543.4)
	85 years or more	2,488	58,053	4285.7	85.9	(4117.3 , 4454.1)
1992	65-74 years	1,969	345,163	570.5	12.9	(545.3 , 595.7)
	75-84 years	2,793	192,933	1447.7	27.4	(1394.0 , 1501.3)
	85 years or more	2,546	60,721	4192.9	83.1	(4030.1 , 4355.8)
1993	65-74 years	2,004	348,018	575.8	12.9	(550.6 , 601.0)
	75-84 years	2,972	198,415	1497.9	27.5	(1444. , 1551.7)
	85 years or more	2,808	63,328	4434.1	83.7	(4270.1 , 4598.1)
1994	65-74 years	1,897	348,969	543.6	12.5	(519.1 , 568.1)
	75-84 years	2,844	204,408	1391.3	26.1	(1340.2 , 1442.5)
	85 years or more	2,540	65,999	3848.5	76.4	(3698.9 , 3998.2)
1995	65-74 years	1,690	350,502	482.2	11.7	(459.2 , 505.2)
	75-84 years	2,838	210,345	1349.2	25.3	(1299.6 , 1398.9)
	85 years or more	2,771	68,538	4043.0	76.8	(3892.5 , 4193.5)
1996	65-74 years	1,782	350,422	508.5	12.0	(484.9 , 532.1)
	75-84 years	2,976	217,120	1370.7	25.1	(1321.4 , 1419.9)
	85 years or more	2,858	71,847	3977.9	74.4	(3832.1 , 4123.7)
1997	65-74 years	1,624	346,821	468.3	11.6	(445.5 , 491.0)
	75-84 years	2,784	223,465	1245.8	23.6	(1199.6 , 1292.1)
	85 years or more	2,642	74,967	3524.2	68.6	(3389.8 , 3658.6)
1998	65-74 years	1,629	345,227	471.9	11.7	(448.9 , 494.8)
	75-84 years	2,793	229,108	1219.1	23.1	(1173.9 , 1264.3)
	85 years or more	2,793	78,375	3563.6	67.4	(3431.5 , 3695.8)
1999	65-74 years	1,550	343,198	451.6	11.5	(429.2 , 474.1)
	75-84 years	2,834	233,931	1211.5	22.8	(1166.9 , 1256.1)
	85 years or more	2,955	81,705	3616.7	66.5	(3486.3 , 3747.1)
2000	65-74 years	1,539	337,166	456.5	11.6	(433.6 , 479.3)
	75-84 years	2,755	240,897	1143.6	21.8	(1100.9 , 1186.3)
	85 years or more	2,974	84,085	3536.9	64.9	(3409.8 , 3664.0)
2001	65-74 years	1,457	338,449	430.5	11.3	(408.4 , 452.6)
	75-84 years	2,785	243,564	1143.4	21.7	(1101.0 , 1185.9)
	85 years or more	2,857	87,725	3256.8	60.9	(3137.3 , 3376.2)
2002	65-74 years	1,347	340,869	395.2	10.8	(374.1 , 416.3)
	75-84 years	2,565	245,217	1046.0	20.7	(1005.5 , 1086.5)
	85 years or more	2,987	91,239	3273.8	59.9	(3156.4 , 3391.2)

Sources:

A) Washington State Department of Health Death Files, 1980-2002

B) Population Estimates: Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, August 2002

[1]CHD=Coronary Heart Disease

[2] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9990 applied to 1980-1998 rates.

Note:

Causes of death were coded with ICD-9 codes 410-414,429.2. ICD-10 codes include: I20-I25

Table 29. Trends in Age-adjusted Stroke Mortality Rates by Age Groups, Washington State Residents and United States, 1980-2002

Year	Age Group	Count of Deaths	Population	Crude Rate[1] (per 100,000)	Standard Error	95% Confidence Interval
1980	65-74 years	596	263,347	226.3	9.3	(208.1 , 244.5)
	75-84 years	1,002	126,739	790.6	25.0	(741.6 , 839.6)
	85 years or more	1,063	41,476	2562.9	78.6	(2408.9 , 2717.0)
1981	65-74 years	571	271,770	210.1	8.8	(192.9 , 227.3)
	75-84 years	1,022	130,680	782.1	24.5	(734.1 , 830.0)
	85 years or more	1,054	42,666	2470.4	76.1	(2321.2 , 2619.5)
1982	65-74 years	517	278,947	185.3	8.2	(169.4 , 201.3)
	75-84 years	991	134,510	736.7	23.4	(690.9 , 782.6)
	85 years or more	949	43,716	2170.8	70.5	(2032.7 , 2308.9)
1983	65-74 years	521	287,226	181.4	7.9	(165.8 , 197.0)
	75-84 years	942	139,404	675.7	22.0	(632.6 , 718.9)
	85 years or more	956	44,712	2138.1	69.2	(2002.6 , 2273.7)
1984	65-74 years	574	294,228	195.1	8.1	(179.1 , 211.0)
	75-84 years	999	144,166	693.0	21.9	(650.0 , 735.9)
	85 years or more	1,054	45,892	2296.7	70.7	(2158.0 , 2435.4)
1985	65-74 years	516	301,647	171.1	7.5	(156.3 , 185.8)
	75-84 years	965	149,011	647.6	20.8	(606.7 , 688.5)
	85 years or more	1,057	47,050	2246.5	69.1	(2111.1 , 2382.0)
1986	65-74 years	467	309,306	151.0	7.0	(137.3 , 164.7)
	75-84 years	952	154,122	617.7	20.0	(578.5 , 656.9)
	85 years or more	1,009	48,791	2068.0	65.1	(1940.4 , 2195.6)
1987	65-74 years	509	317,141	160.5	7.1	(146.6 , 174.4)
	75-84 years	991	160,755	616.5	19.6	(578.1 , 654.8)
	85 years or more	1,010	50,087	2016.5	63.5	(1892.1 , 2140.9)
1988	65-74 years	510	323,345	157.7	7.0	(144.0 , 171.4)
	75-84 years	1,043	166,752	625.5	19.4	(587.5 , 663.4)
	85 years or more	1,143	51,634	2213.7	65.5	(2085.3 , 2342.0)
1989	65-74 years	426	329,174	129.4	6.3	(117.1 , 141.7)
	75-84 years	974	173,345	561.9	18.0	(526.6 , 597.2)
	85 years or more	1,144	53,558	2136.0	63.2	(2012.2 , 2259.8)
1990	65-74 years	458	334,630	136.9	6.4	(124.3 , 149.4)
	75-84 years	976	181,347	538.2	17.2	(504.4 , 572.0)
	85 years or more	1,151	55,427	2076.6	61.2	(1956.6 , 2196.6)
1991	65-74 years	466	340,906	136.7	6.3	(124.3 , 149.1)
	75-84 years	1,019	187,406	543.7	17.0	(510.4 , 577.1)
	85 years or more	1,183	58,053	2037.8	59.2	(1921.7 , 2153.9)
1992	65-74 years	505	345,163	146.3	6.5	(133.5 , 159.1)
	75-84 years	1,085	192,933	562.4	17.1	(528.9 , 595.8)
	85 years or more	1,244	60,721	2048.7	58.1	(1934.9 , 2162.6)
1993	65-74 years	511	348,018	146.8	6.5	(134.1 , 159.6)
	75-84 years	1,186	198,415	597.7	17.4	(563.7 , 631.8)
	85 years or more	1,365	63,328	2155.4	58.3	(2041.1 , 2269.8)
1994	65-74 years	500	348,969	143.3	6.4	(130.7 , 155.8)
	75-84 years	1,132	204,408	553.8	16.5	(521.5 , 586.1)
	85 years or more	1,387	65,999	2101.5	56.4	(1990.9 , 2212.1)
1995	65-74 years	487	350,502	138.9	6.3	(126.6 , 151.3)
	75-84 years	1,213	210,345	576.7	16.6	(544.2 , 609.1)
	85 years or more	1,461	68,538	2131.7	55.8	(2022.4 , 2241.0)
1996	65-74 years	514	350,422	146.7	6.5	(134.0 , 159.4)
	75-84 years	1,293	217,120	595.5	16.6	(563.1 , 628.0)
	85 years or more	1,585	71,847	2206.1	55.4	(2097.5 , 2314.7)
1997	65-74 years	465	346,821	134.1	6.2	(121.9 , 146.3)
	75-84 years	1,272	223,465	569.2	16.0	(537.9 , 600.5)
	85 years or more	1,525	74,967	2034.2	52.1	(1932.1 , 2136.3)
1998	65-74 years	467	345,227	135.3	6.3	(123.0 , 147.5)
	75-84 years	1,302	229,108	568.3	15.7	(537.4 , 599.2)
	85 years or more	1,519	78,375	1938.1	49.7	(1840.7 , 2035.6)
1999	65-74 years	442	343,198	128.8	6.1	(116.8 , 140.8)
	75-84 years	1,263	233,931	539.9	15.2	(510.1 , 569.7)
	85 years or more	1,693	81,705	2072.1	50.4	(1973.4 , 2170.8)
2000	65-74 years	419	337,166	124.3	6.1	(112.4 , 136.2)
	75-84 years	1,323	240,897	549.2	15.1	(519.6 , 578.8)
	85 years or more	1,642	84,085	1952.8	48.2	(1858.3 , 2047.2)
2001	65-74 years	444	338,449	131.2	6.2	(119.0 , 143.4)
	75-84 years	1,318	243,564	541.1	14.9	(511.9 , 570.3)
	85 years or more	1,667	87,725	1900.3	46.5	(1809.0 , 1991.5)
2002	65-74 years	419	340,869	122.9	6.0	(111.2 , 134.7)
	75-84 years	1,251	245,217	510.2	14.4	(481.9 , 538.4)
	85 years or more	1,782	91,239	1953.1	46.3	(1862.4 , 2043.8)

Sources:

A) Washington State Department of Health Death Files, 1980-2002

B) Population Estimates: Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, August 2002

[1] Rate per 100,000 in specific age grouping, does not include deaths where age is unknown

*ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 1.0588 applied to 1980-1998 rates.

Note:

Causes of death were coded with ICD-9 codes 430-434,436-438. ICD-10 codes include: I60-I69

Table 30. Trends in Cardiovascular Disease Mortality by Race and Ethnicity, Washington State Residents and United States, 2000-2002

Race/Ethnicity Group	Age-Adjusted Rate[1] (per 100,000)	95% Confidence Interval
Asian/Pacific Islander	207.8	(186.3 , 229.3)
American Indian/Alaskan Native	343.8	(284.6 , 403.0)
Black	385.2	(344.1 , 426.2)
White	298.2	(293.5 , 302.8)
Hispanic	211.9	(178.8 , 245.1)
Non-Hispanic	298.6	(294.1 , 303.2)

Sources:

A) Washington State Department of Health Death Files, 2000-2002

B) Population Estimates: Washington State Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, July 2003

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

Note:

Causes of death were coded with ICD-10. Codes include: I00-I78

Table 31. Trends in Coronary Heart Disease Mortality by Race and Ethnicity, Washington State Residents and United States, 2000-2002

Race/Ethnicity Group	Age-Adjusted Rate[1] (per 100,000)	95% Confidence Interval
Asian/Pacific Islander	97.0	(88.5 , 106.1)
American Indian/Alaskan Native	179.4	(155.4 , 206.5)
Black	194.0	(177.3 , 212.1)
White	157.1	(155.1 , 159.1)
Hispanic	103.9	(90.9 , 118.5)
Non-Hispanic	156.6	(154.6 , 158.5)

Sources:

A) Washington State Department of Health Death Files, 2000-2002

B) Population Estimates: Washington State Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, July 2003

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

Note:

Causes of death were coded with ICD-10. Codes include: I20-I25

Table 32. Trends in Stroke Mortality by Race and Ethnicity, Washington State Residents and United States, 2000-2002

Race/Ethnicity Group	Age-Adjusted Rate[1] (per 100,000)	95% Confidence Interval
Asian/Pacific Islander	65.3	(58.5 , 72.9)
American Indian/Alaskan Native	89.7	(72.2 , 110.6)
Black	91.8	(80.0 , 104.9)
White	68.5	(67.2 , 69.8)
Hispanic	54.7	(45.2 , 65.6)
Non-Hispanic	69.3	(68.0 , 70.6)

Sources:

A) Washington State Department of Health Death Files, 2000-2002

B) Population Estimates: Washington State Office of Financial Management, Forecasting Division, Intercensal and Postcensal Estimates of County Population by Age and Sex: 1980-2002, July 2003

[1] Rate per 100,000 age-adjusted to the U.S. 2000 standard population, does not include deaths where age is unknown

Note:

Causes of death were coded with ICD-10. Codes include: I60-I69

Table 33. Coronary Heart Disease Mortality by County, Washington Residents, 1996-1998 & 2000-2002

County	3-Year Average Annual Number of Deaths 1996-1998	3-Year Average Annual Number of Deaths 2000-2002	3-Year Average of Total 2000-2002 Deaths	CHD[1] Deaths as a % of all Deaths (2000-2002)	3-Year Average Age-Adjusted Rate[2] of Death 1996-1998[3]	3-Year Average Age-Adjusted Rate[2] of Death 2000-2002	% change in Rate, 1996-1998 to 2000-2002
Adams	22	25	111	22.5%	173.9	185.5	6.7%
Asotin	37	37	204	18.1%	139.9	135.4	-3.2%
Benton	187	176	987	17.8%	178.3	149.3	-16.3%
Chelan	109	129	566	22.8%	146.8	167.7	14.3%
Clallam	157	147	786	18.7%	167.5	141.6	-15.5%
Clark	412	416	2,374	17.5%	172.8	148.9	-13.8%
Columbia	11	9	47	19.1%	172.2	153.8	-10.7%
Cowlitz	225	174	933	18.6%	240.6	170.3	-29.2%
Douglas	43	45	241	18.7%	149.0	138.9	-6.7%
Ferry	14	14	48	29.2%	236.1	209.2	-11.4%
Franklin	61	54	307	17.6%	204.0	165.4	-18.9%
Garfield	*	*	28	*	*	*	*
Grant	134	123	536	22.9%	224.9	184.3	-18.1%
Grays Harbor	162	162	816	19.9%	208.9	199.1	-4.7%
Island	105	105	554	19.0%	156.4	138.1	-11.7%
Jefferson	51	52	264	19.7%	136.2	128.1	-5.9%
King	2,257	2,111	11,552	18.3%	157.5	133.7	-15.1%
Kitsap	319	327	1,776	18.4%	168.7	159.0	-5.7%
Kittitas	48	43	251	17.1%	155.7	129.5	-16.8%
Klickitat	31	29	170	17.1%	161.8	135.7	-16.1%
Lewis	208	170	756	22.5%	260.9	196.5	-24.7%
Lincoln	30	26	116	22.4%	201.2	166.1	-17.4%
Mason	83	89	502	17.7%	157.1	151.2	-3.8%
Okanogan	65	66	365	18.1%	154.9	151.6	-2.1%
Pacific	68	70	311	22.5%	211.0	204.5	-3.1%
Pend Oreille	22	20	114	17.5%	173.8	153.3	-11.8%
Pierce	1,062	1,119	5,330	21.0%	201.2	189.9	-5.6%
San Juan	16	14	121	11.6%	87.0	64.4	-26.0%
Skagit	153	153	955	16.0%	137.8	123.7	-10.2%
Skamania	12	9	68	13.2%	162.9	96.7	-40.6%
Snohomish	726	729	3,928	18.6%	179.7	153.5	-14.6%
Spokane	679	701	3,686	19.0%	164.3	158.1	-3.8%
Stevens	69	84	365	23.0%	188.6	199.3	5.7%
Thurston	305	280	1,604	17.5%	170.9	140.9	-17.6%
Wahkiakum	13	12	52	23.1%	247.0	226.7	-8.2%
Walla Walla	94	82	526	15.6%	136.4	116.9	-14.3%
Whatcom	210	224	1,253	17.9%	142.9	136.5	-4.5%
Whitman	51	55	229	24.0%	166.8	172.6	3.5%
Yakima	347	355	1,739	20.4%	168.6	168.5	-0.1%
State	8,606	8,446	44,570	18.9%	171.1	152.1	-11.1%

Sources:

A) Washington State Department of Health Death Files, 1996-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1]CHD=Coronary Heart Disease

[2]Rate per 100,000 in specific age group.

[3]ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 0.9990 applied to 1996-1998 rates.

*Count of death <5, rate statistically unreliable

Notes:

A) Causes of death were coded with ICD-9 codes 410-414,429.2. ICD-10 codes include: I20-I25

B) Numbers may not reflect other publications due to rounding

Table 34. Stroke Mortality by County, Washington Residents, 1996-1998 & 2000-2002

County	3-Year Average Annual Number of Deaths 1996-1998	3-Year Average Annual Number of Deaths 2000-2002	3-Year Average of total 2000-2002 Deaths	Stroke Deaths as a % of all Deaths (2000-2002)	3-Year Average Age-Adjusted Rate[1] of Death 1996-1998[2]	3-Year Average Age-Adjusted Rate[1] of Death 2000-2002	% change in Rate, 1996-1998 to 2000-2002
Adams	14	8	111	7.2%	120.3	60.2	-50.0%
Asotin	24	18	204	8.8%	95.9	60.8	-36.6%
Benton	64	79	987	8.0%	68.6	68.3	-0.4%
Chelan	47	49	566	8.7%	66.5	61.9	-6.9%
Clallam	71	79	786	10.1%	78.6	73.9	-6.0%
Clark	156	204	2,374	8.6%	70.1	75.1	7.1%
Columbia	*	*	47	*	*	*	*
Cowlitz	64	83	933	8.9%	72.7	80.4	10.6%
Douglas	15	24	241	10.0%	56.5	75.0	32.7%
Ferry	7	*	48	*	130.2	*	*
Franklin	30	25	307	8.1%	112.1	80.5	-28.2%
Garfield	*	*	28	*	*	*	*
Grant	44	43	536	8.0%	81.7	66.2	-19.0%
Grays Harbor	63	64	816	7.8%	85.9	78.4	-8.7%
Island	34	43	554	7.8%	57.6	59.1	2.6%
Jefferson	22	28	264	10.6%	66.6	70.7	6.2%
King	931	985	11,552	8.5%	69.1	62.0	-10.3%
Kitsap	116	145	1,776	8.2%	65.9	71.1	7.9%
Kittitas	20	22	251	8.8%	68.2	64.0	-6.2%
Klickitat	9	12	170	7.1%	49.2	58.7	19.3%
Lewis	79	67	756	8.9%	103.6	75.7	-26.9%
Lincoln	10	10	116	8.6%	67.3	58.9	-12.5%
Mason	38	36	502	7.2%	77.0	63.2	-17.9%
Okanogan	26	28	365	7.7%	66.2	63.6	-3.9%
Pacific	20	21	311	6.8%	66.1	59.8	-9.5%
Pend Oreille	9	8	114	7.0%	84.7	69.8	-17.6%
Pierce	371	431	5,330	8.1%	76.0	74.5	-2.0%
San Juan	7	12	121	9.9%	40.5	57.7	42.5%
Skagit	76	85	955	8.9%	72.1	67.9	-5.8%
Skamania	*	*	68	*	*	*	*
Snohomish	292	332	3,928	8.5%	78.7	71.5	-9.1%
Spokane	273	294	3,686	8.0%	69.3	64.7	-6.6%
Stevens	28	28	365	7.7%	82.7	68.7	-16.9%
Thurston	114	122	1,604	7.6%	68.7	61.9	-9.9%
Wahkiakum	*	*	52	*	*	*	*
Walla Walla	53	57	526	10.8%	79.3	76.0	-4.2%
Whatcom	115	104	1,253	8.3%	82.6	62.5	-24.3%
Whitman	18	24	229	10.5%	61.0	73.2	20.0%
Yakima	154	152	1,739	8.7%	78.2	71.2	-9.0%
State	3,432	3,741	44,570	8.4%	73.0	67.5	-7.5%

Sources:

A) Washington State Department of Health Death Files, 1996-2002

B) Intercensal and Postcensal Estimates of County Population by Age and Sex, 1990-2003: Office of Financial Management, Washington State, November 2003.

[1]Rate per 100,000 in specific age group.

[2]ICD coding changed from ICD-9 in 1998 to ICD-10 in 1999. Comparability Ratio 1.0588 applied to 1996-1998 rates.

*Count of death <5, rate statistically unreliable

Notes:

A) Causes of death were coded with ICD-9 codes 430-434, 436-438 ICD-10 codes include: I60-I69

B) Numbers may not reflect other publications due to rounding